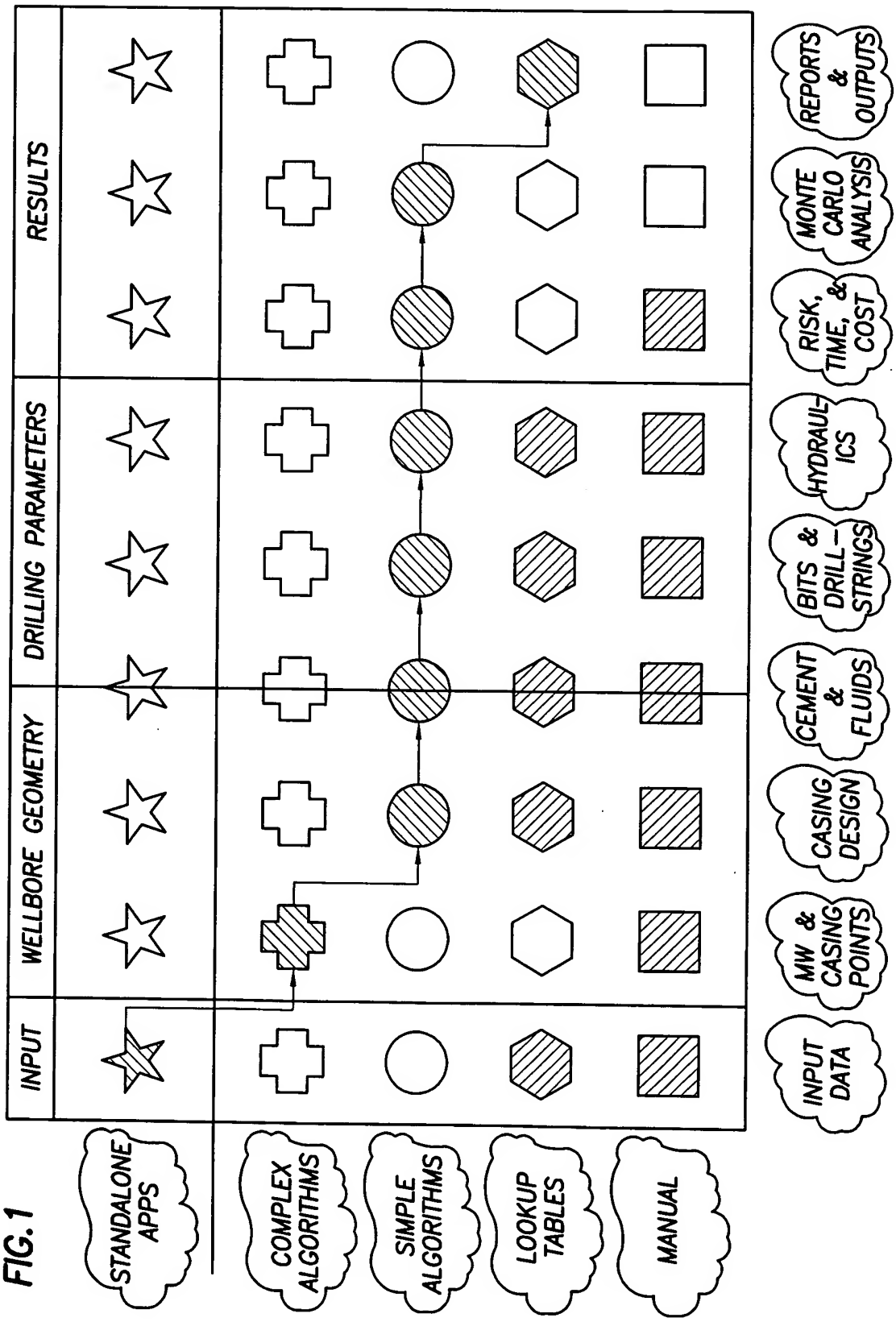
FIG. 1


INPUT
WELLBORE GEOMETRY
DRILLING PARAMETERS
RESULTS
STANDALONE APPS
COMPLEX ALGORITHMS
SIMPLE ALGORITHMS
LOOKUP TABLES
MANUAL
INPUT DATA
MW & CASING POINTS
CASING DESIGN
CEMENT & FLUIDS
BITS & DRILL-STRINGS
HYDRAULICS
RISK, TIME, & COST
MONTE CARLO ANALYSIS
REPORTS & OUTPUTS

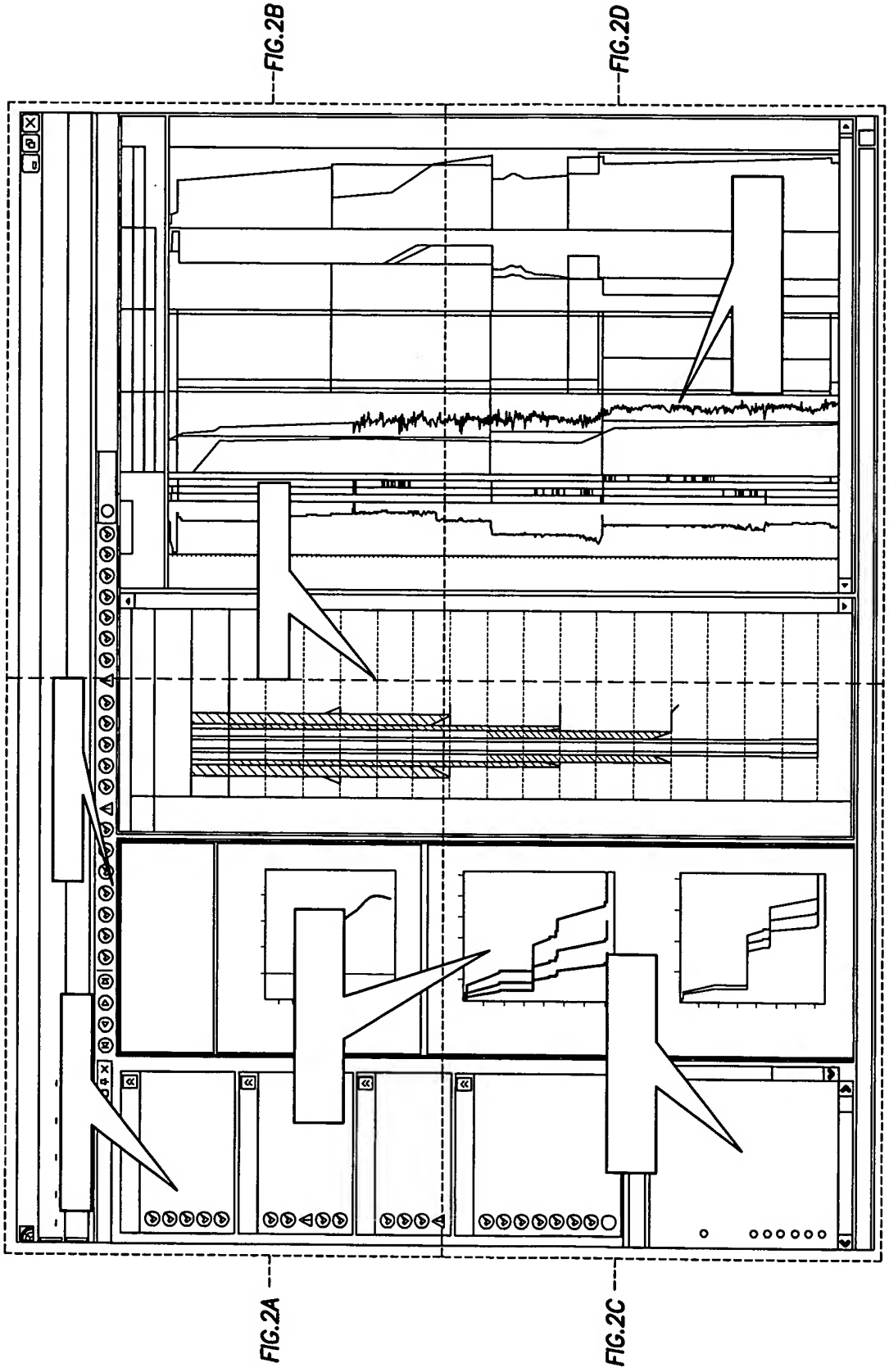


FIG.2

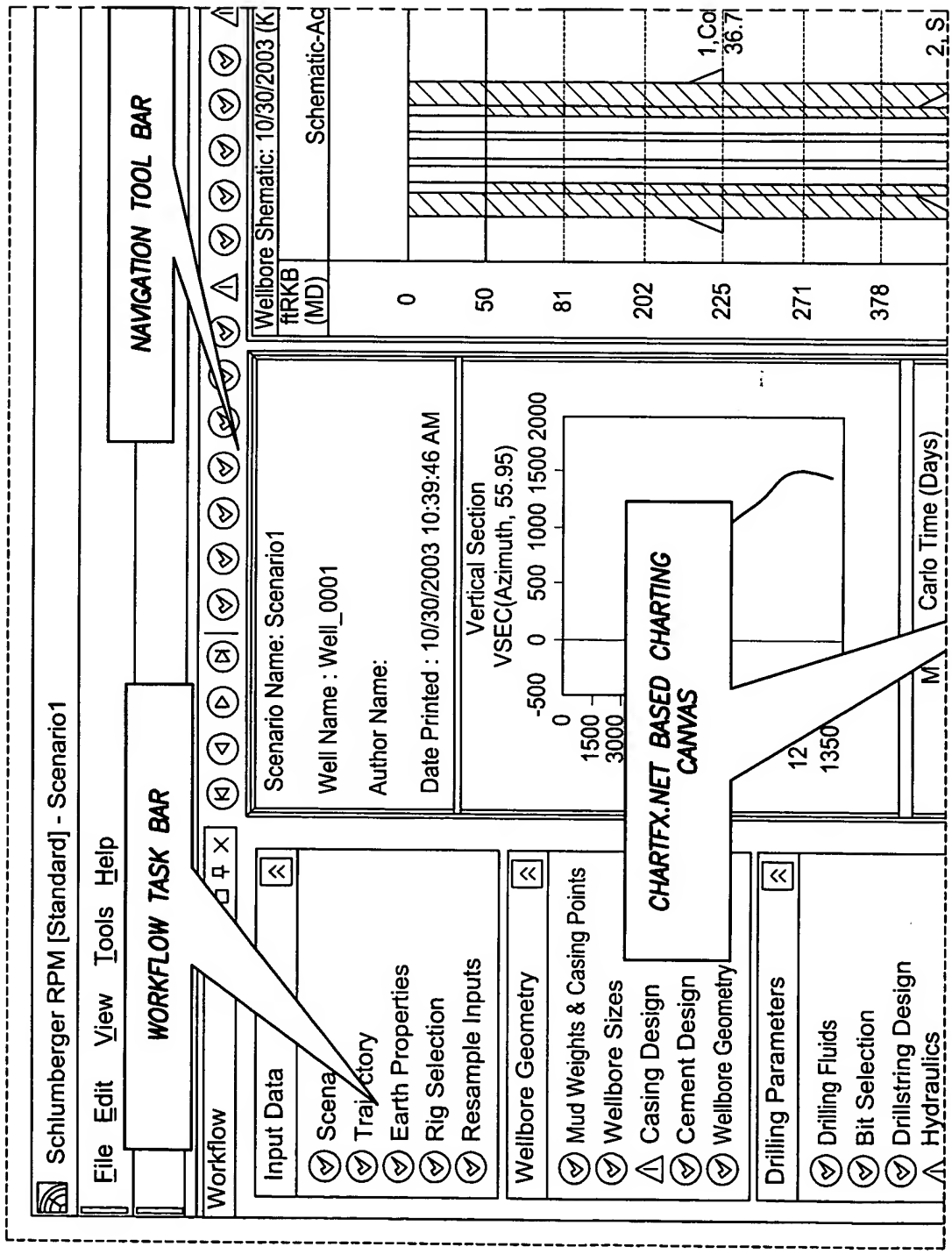

Schlumberger RPM [Standard] - Scenario1
File Edit View Tools Help
WORKFLOW TASK BAR
NAVIGATION TOOL BAR
Workflow
Input Data
Scena
Trajectory
Earth Properties
Rig Selection
Resample Inputs
Wellbore Geometry
Mud Weights & Casing Points
Wellbore Sizes
Casing Design
Cement Design
Wellbore Geometry
Drilling Parameters
Drilling Fluids
Bit Selection
Drillstring Design
Hydraulics
Scenario Name: Scenario1
Well Name : Well_0001
Author Name:
Date Printed : 10/30/2003 10:39:46 AM
Vertical Section
VSEC(Azimuth, 55.95)
-500 0 500 1000 1500 2000
0
1500
3000
CHARTFX.NET BASED CHARTING CANVAS
12
1350
Carlo Time (Days)
M
Wellbore Shematic: 10/30/2003 (K
ftRKB (MD)
Schematic-Ac
0
50
81
202
225
271
378
1,Co
36.7
2, S

FIG.2A

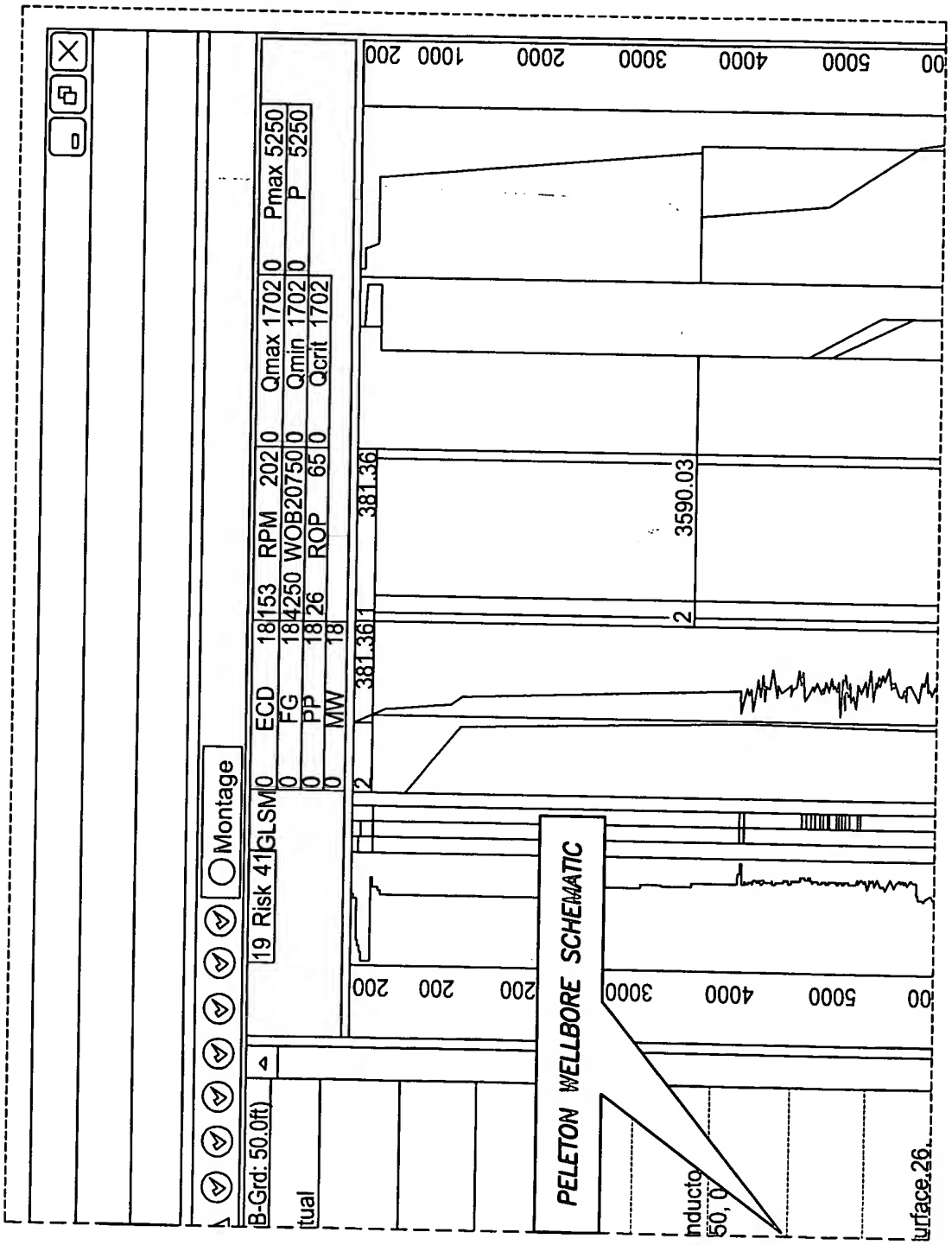

Montage
19 Risk 41
GLSM 0
ECD 18
FG 18
PP 18
MW 18
RPM 153
WOB 250
ROP 26
Qmax 1702
Qmin 1702
Qcrit 1702
Pmax 5250
P 5250
381.36
3590.03
PELETON WELLBORE SCHEMATIC
B-Grd: 50.0ft)
tual
Inducto
50, 0
urface,26.

FIG.2B

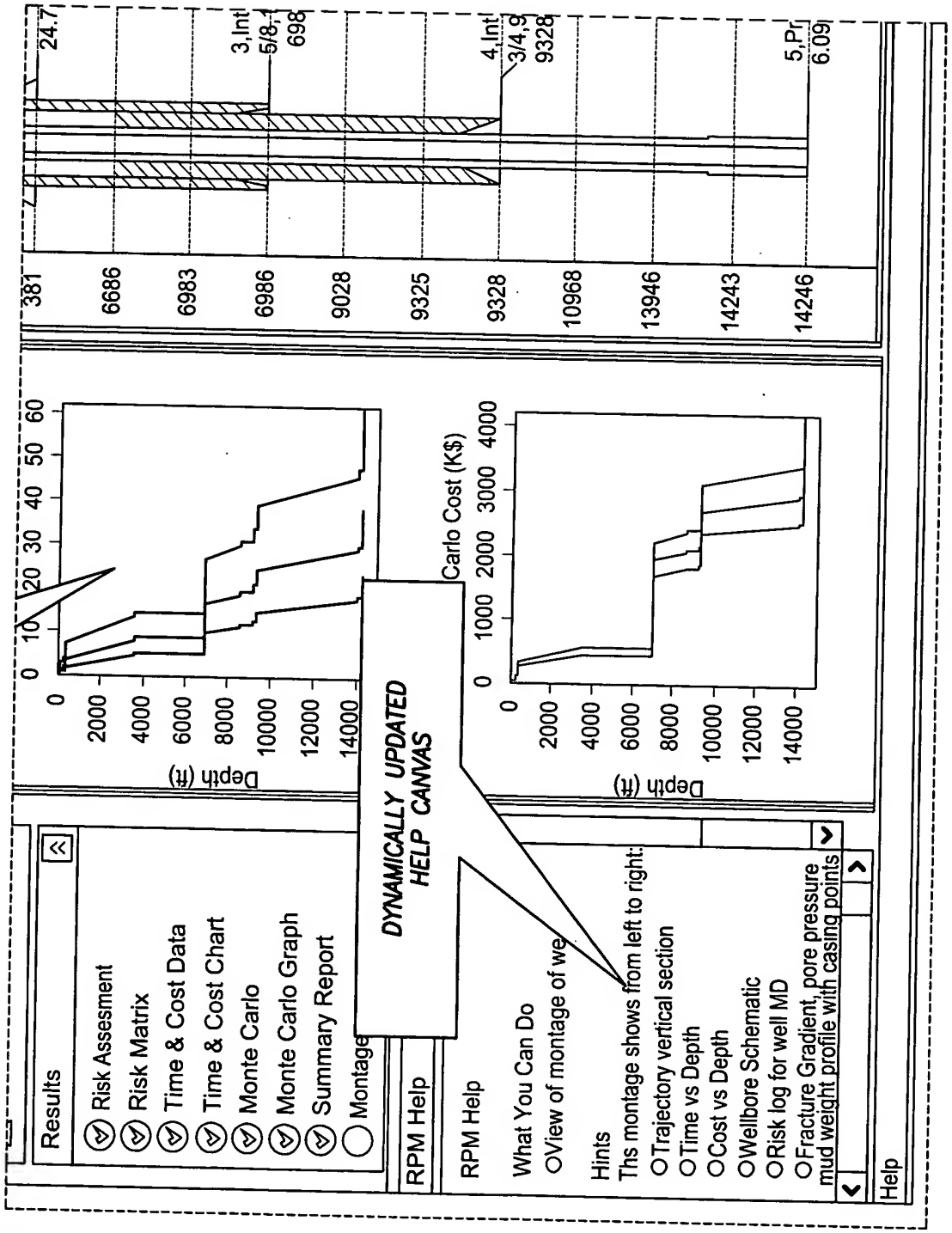

Results
Risk Assesment
Risk Matrix
Time & Cost Data
Time & Cost Chart
Monte Carlo
Monte Carlo Graph
Summary Report
Montage
RPM Help
RPM Help
What You Can Do
View of montage of we
Hints
Ths montage shows from left to right:
Trajectory vertical section
Time vs Depth
Cost vs Depth
Wellbore Schematic
Risk log for well MD
Fracture Gradient, pore pressure mud weight profile with casing points
Help
DYNAMICALLY UPDATED HELP CANVAS
Depth (ft)
Carlo Cost (K$)
3,Int
4,Int
5,Pr
24.7
6.09

FIG.2C

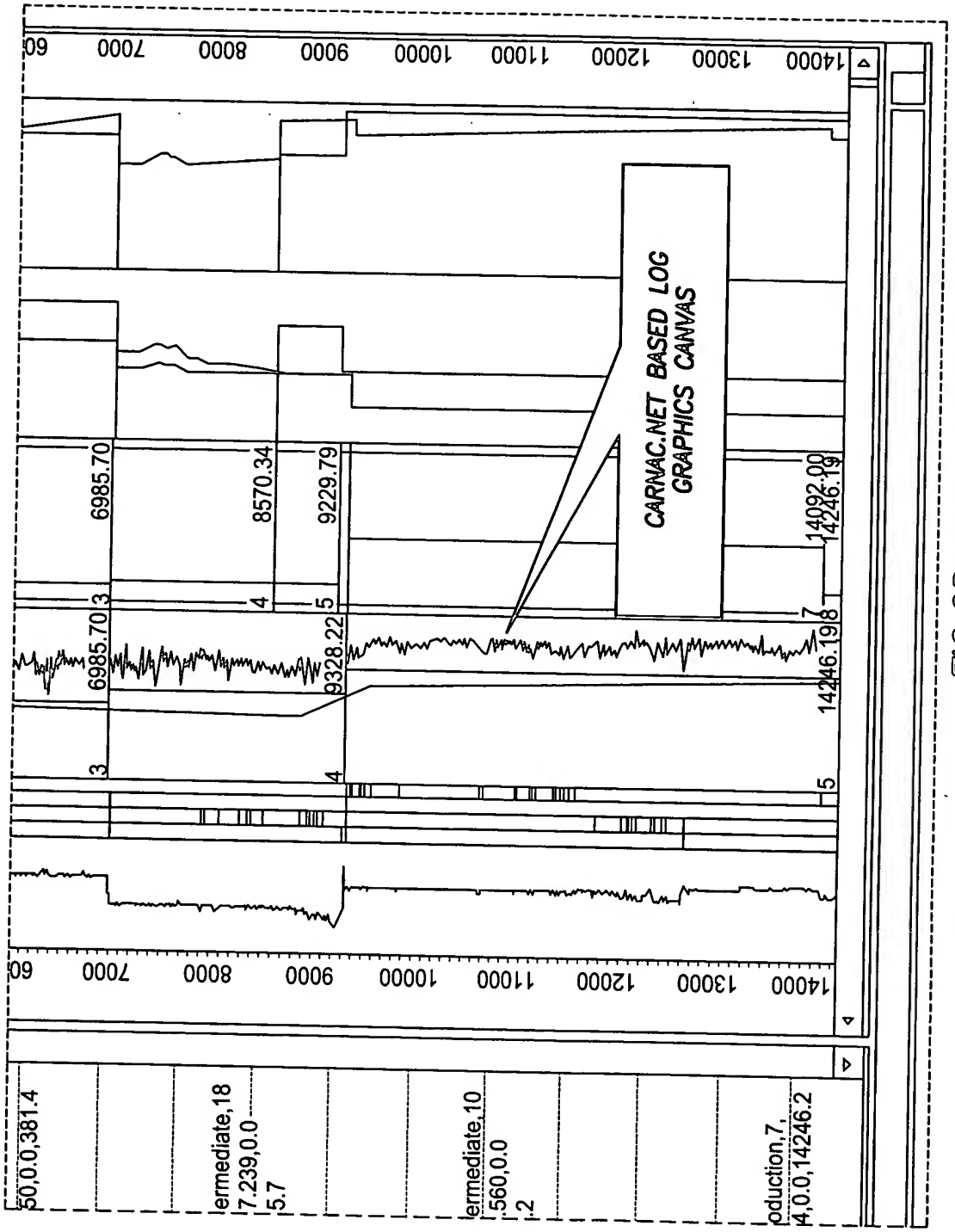

CARNAC.NET BASED LOG
GRAPHICS CANVAS
6985.70
8570.34
9229.79
14092.00
14246.19
6985.70
9328.22
14246.19
50,0.0,381.4
ermediate,18
7.239,0.0
5.7
ermediate,10
.560,0.0
.2
oduction,7,
4,0.0,14246.2

FIG.2D

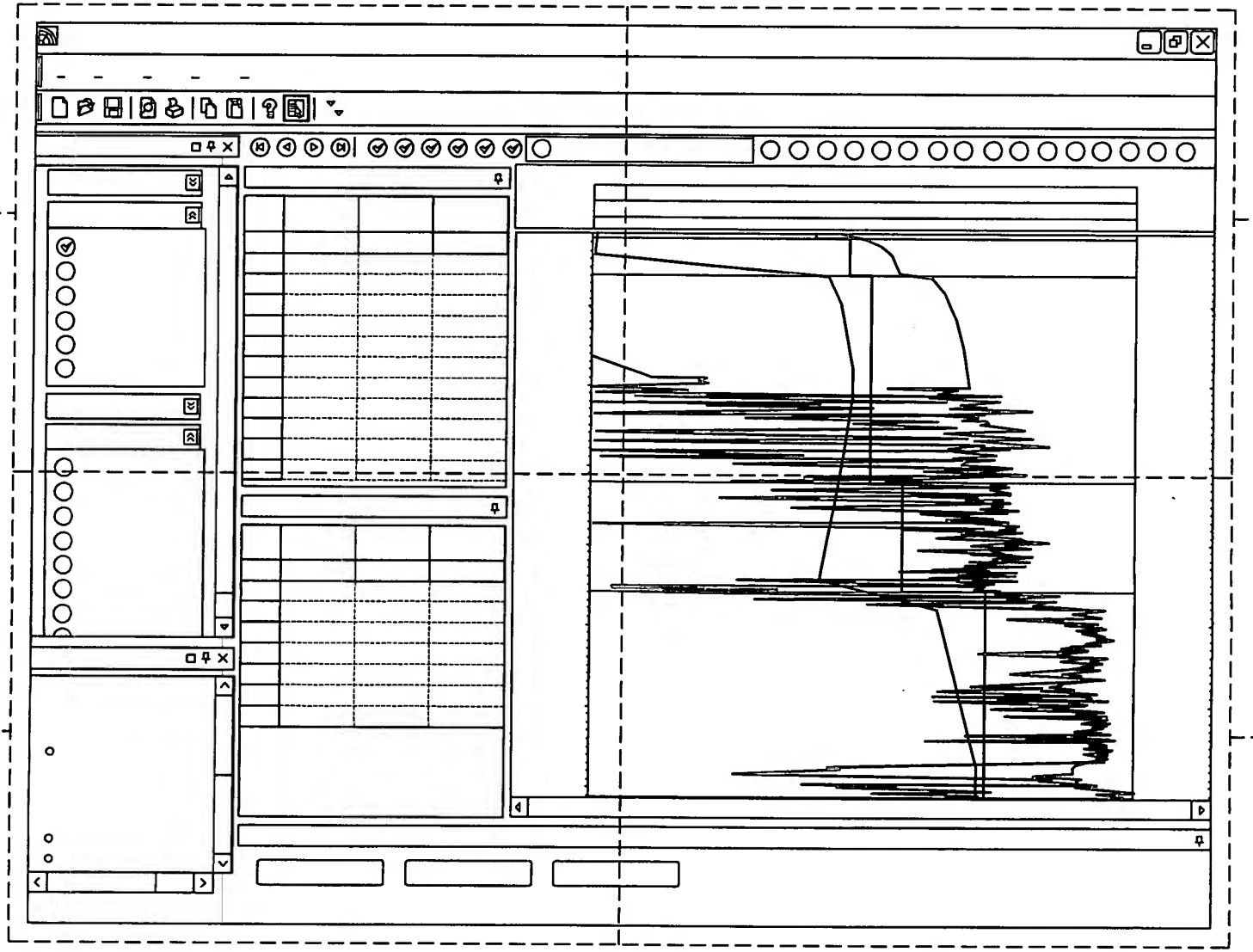


FIG.3

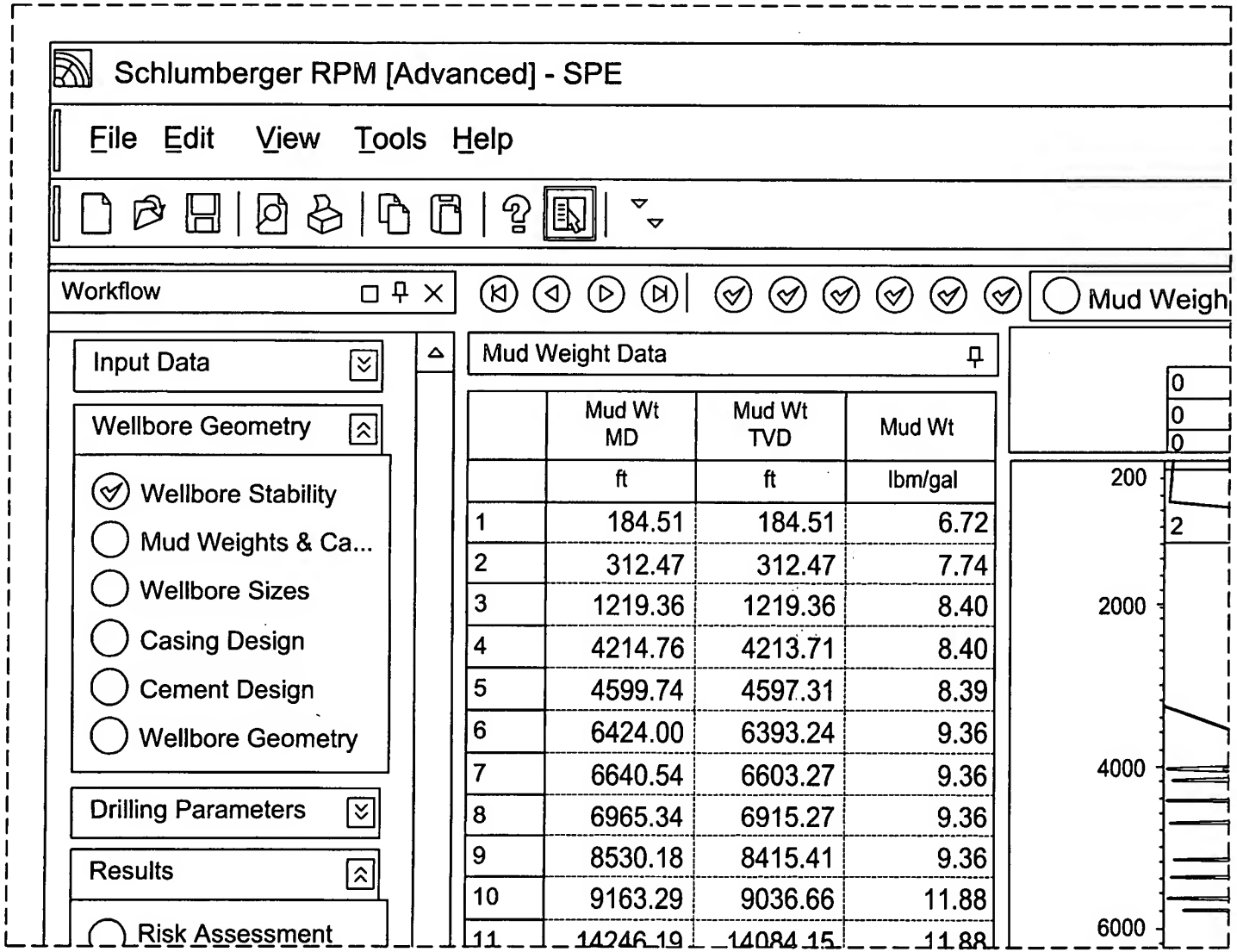

Schlumberger RPM [Advanced] - SPE
File Edit View Tools Help
Workflow
Mud Weigh
Input Data
Wellbore Geometry
Wellbore Stability
Mud Weights & Ca...
Wellbore Sizes
Casing Design
Cement Design
Wellbore Geometry
Drilling Parameters
Results
Risk Assessment
Mud Weight Data
Mud Wt MD
Mud Wt TVD
Mud Wt
ft
ft
lbm/gal
1 184.51 184.51 6.72
2 312.47 312.47 7.74
3 1219.36 1219.36 8.40
4 4214.76 4213.71 8.40
5 4599.74 4597.31 8.39
6 6424.00 6393.24 9.36
7 6640.54 6603.27 9.36
8 6965.34 6915.27 9.36
9 8530.18 8415.41 9.36
10 9163.29 9036.66 11.88
11 14246.19 14084.15 11.88
0
0
0
200
2
2000
4000
6000

FIG.3A

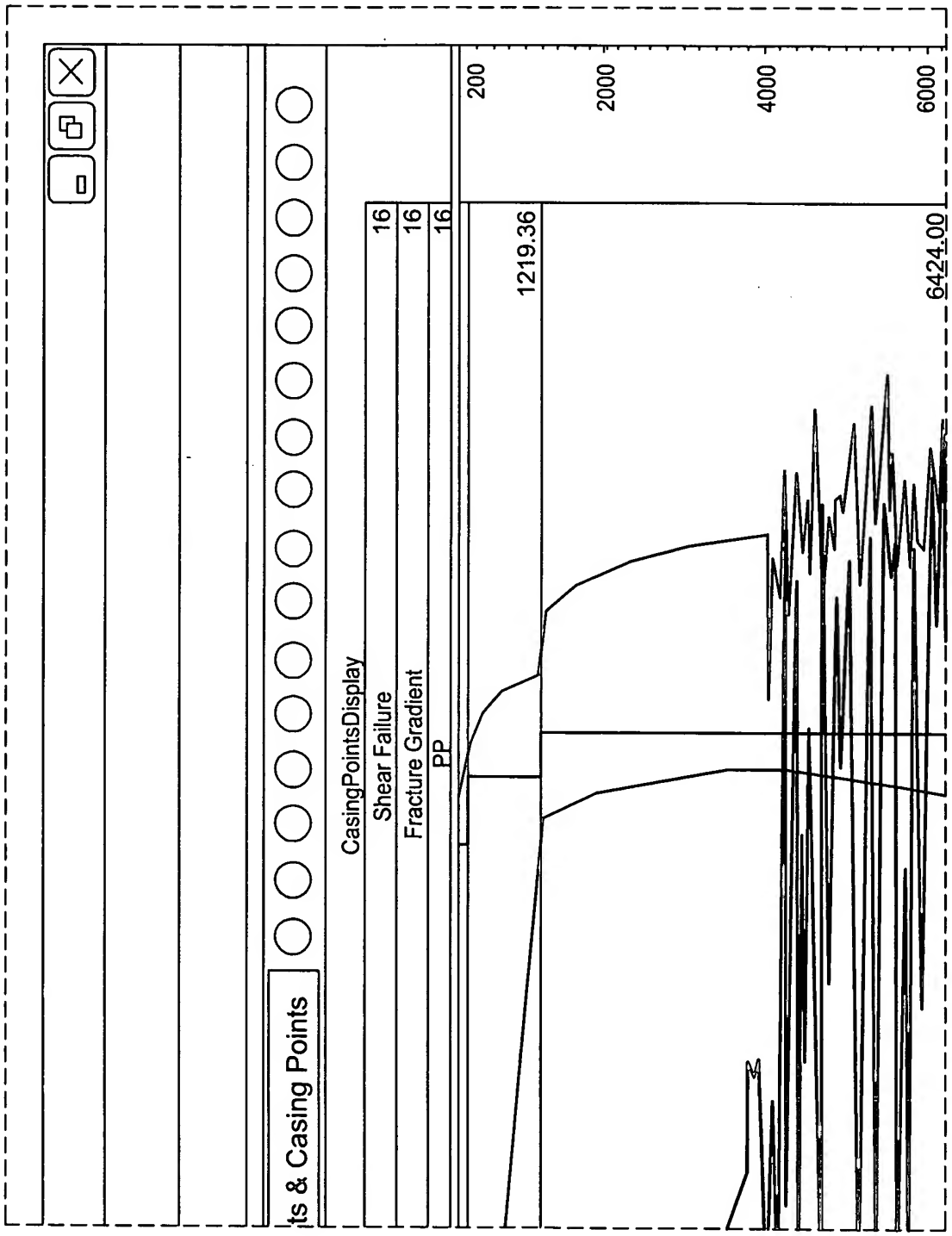

ts & Casing Points
CasingPointsDisplay
Shear Failure
Fracture Gradient
PP
16
16
16
200
2000
4000
6000
1219.36
6424.00

FIG.3B

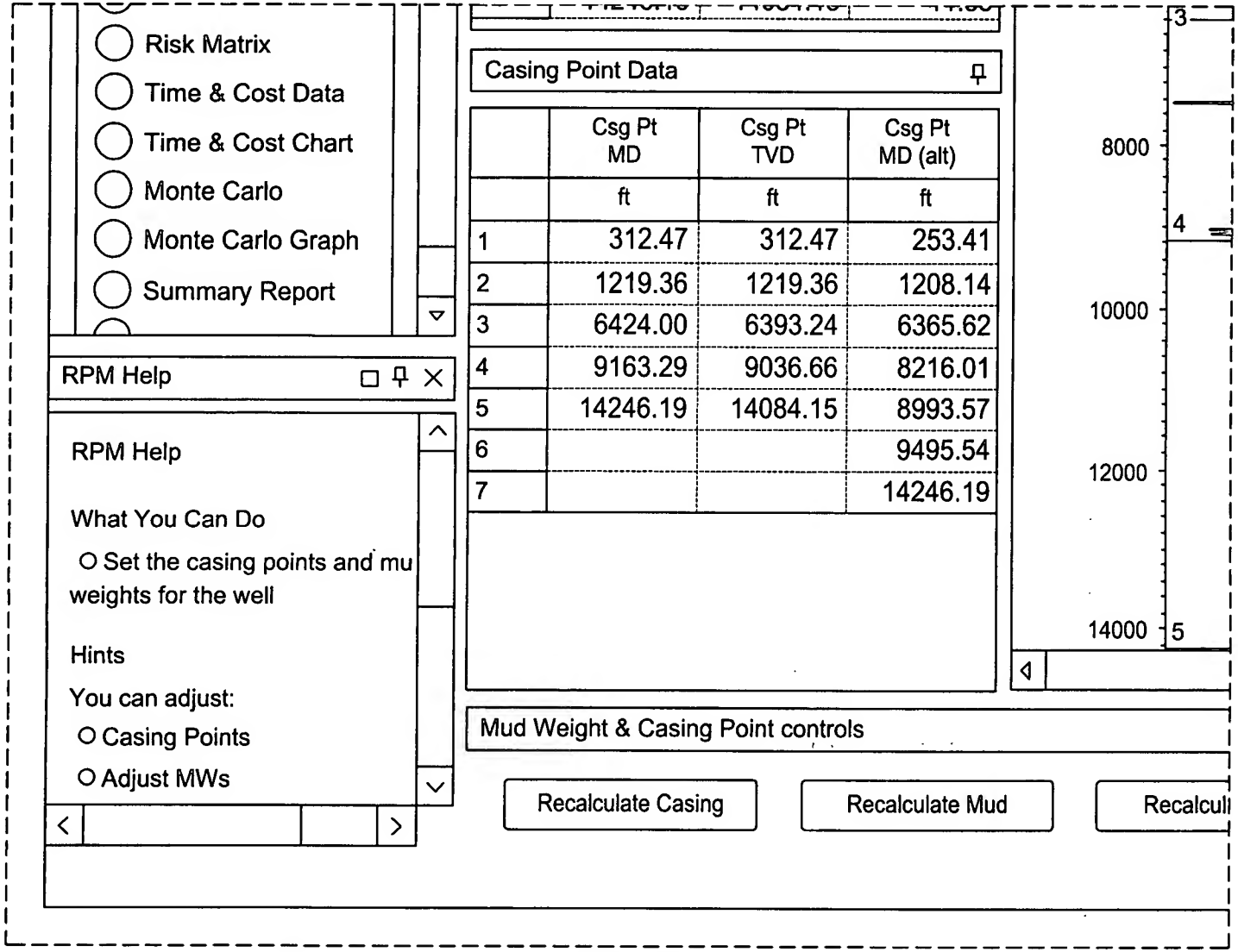

Risk Matrix
Time & Cost Data
Time & Cost Chart
Monte Carlo
Monte Carlo Graph
Summary Report
RPM Help
RPM Help
What You Can Do
O Set the casing points and mu weights for the well
Hints
You can adjust:
O Casing Points
O Adjust MWs
Casing Point Data
Csg Pt MD
Csg Pt TVD
Csg Pt MD (alt)
ft
ft
ft
1 312.47 312.47 253.41
2 1219.36 1219.36 1208.14
3 6424.00 6393.24 6365.62
4 9163.29 9036.66 8216.01
5 14246.19 14084.15 8993.57
6 9495.54
7 14246.19
8000
10000
12000
14000
3
4
5
Mud Weight & Casing Point controls
Recalculate Casing
Recalculate Mud
Recalcul

FIG.3C

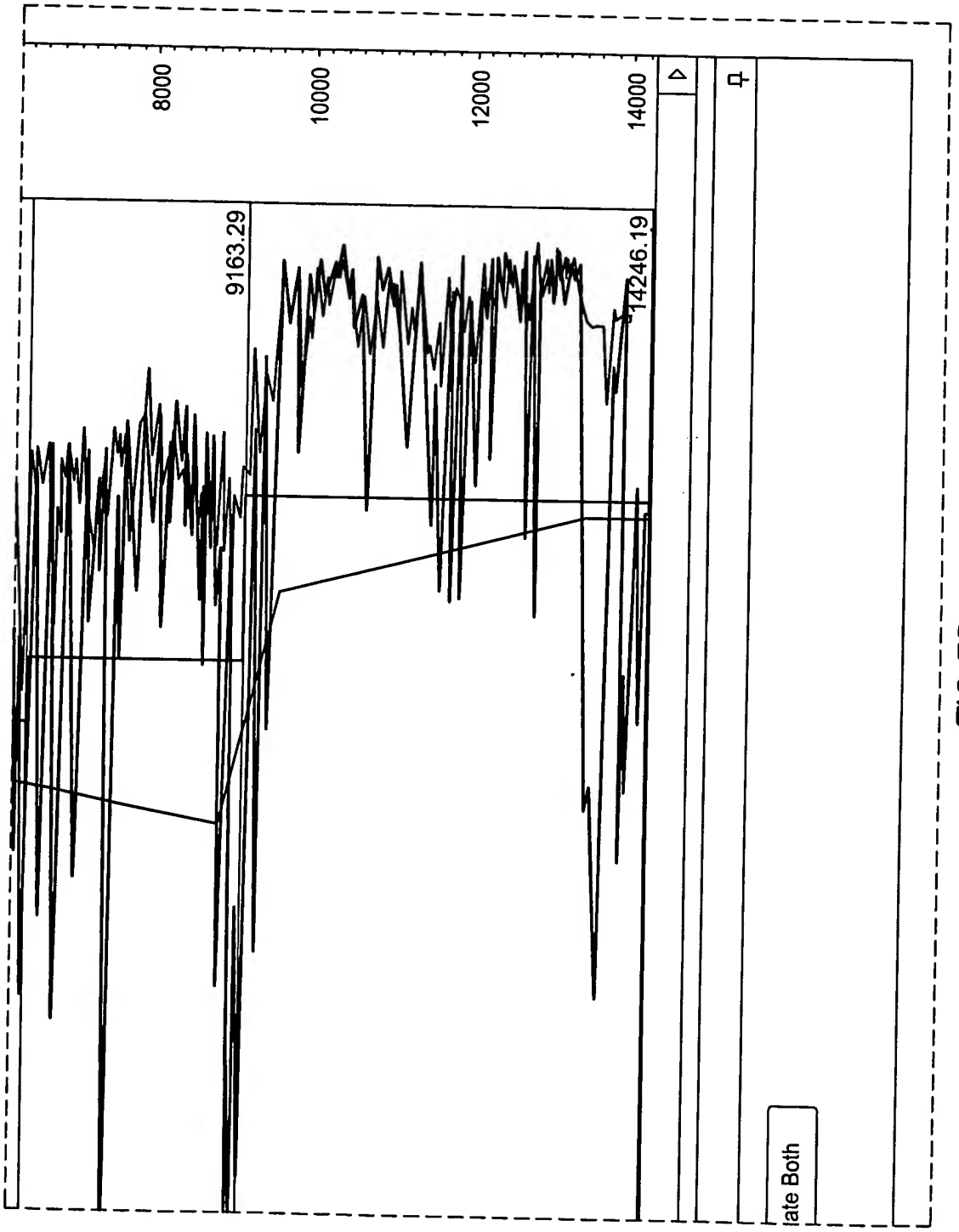


FIG.3D

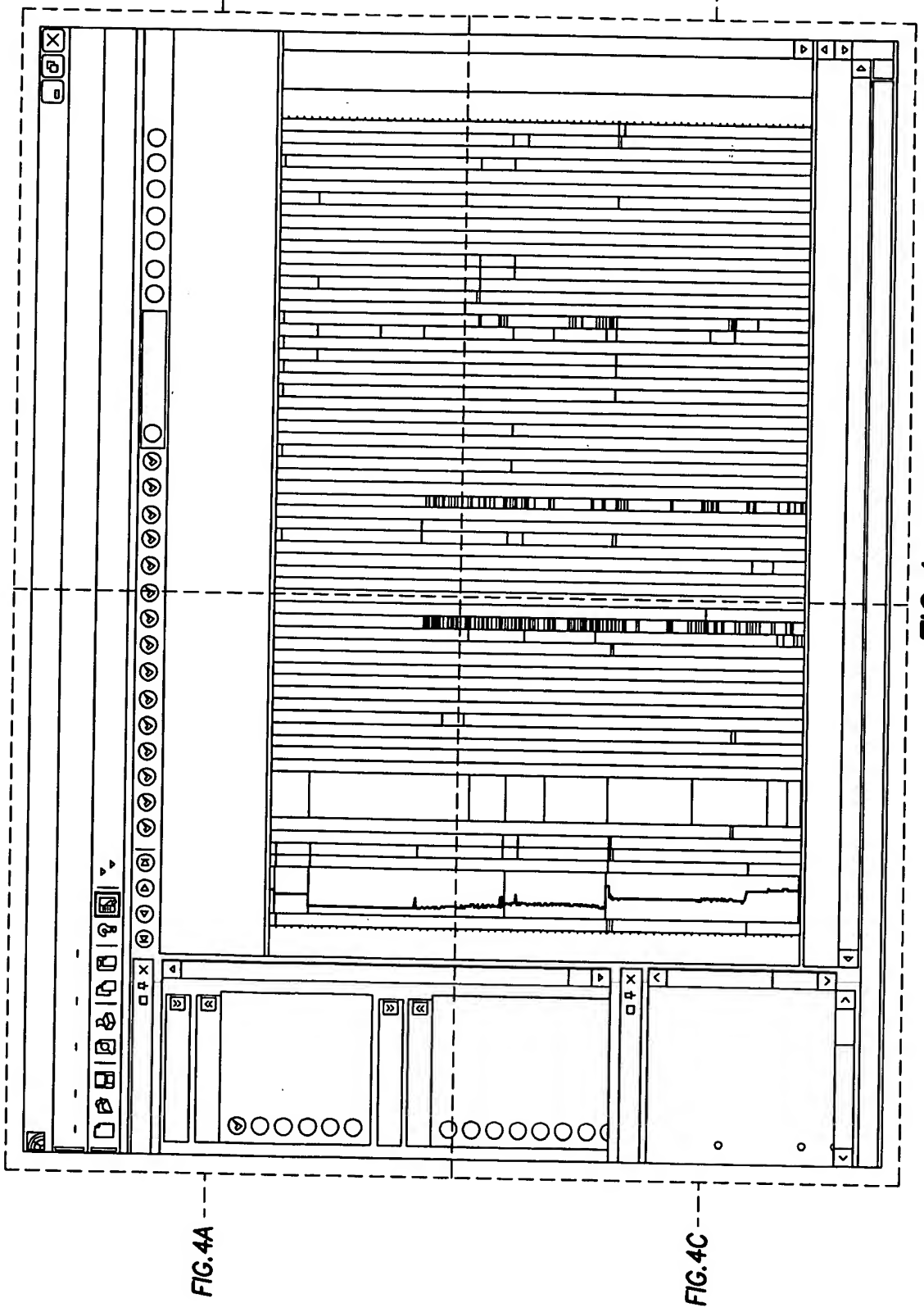


FIG.4

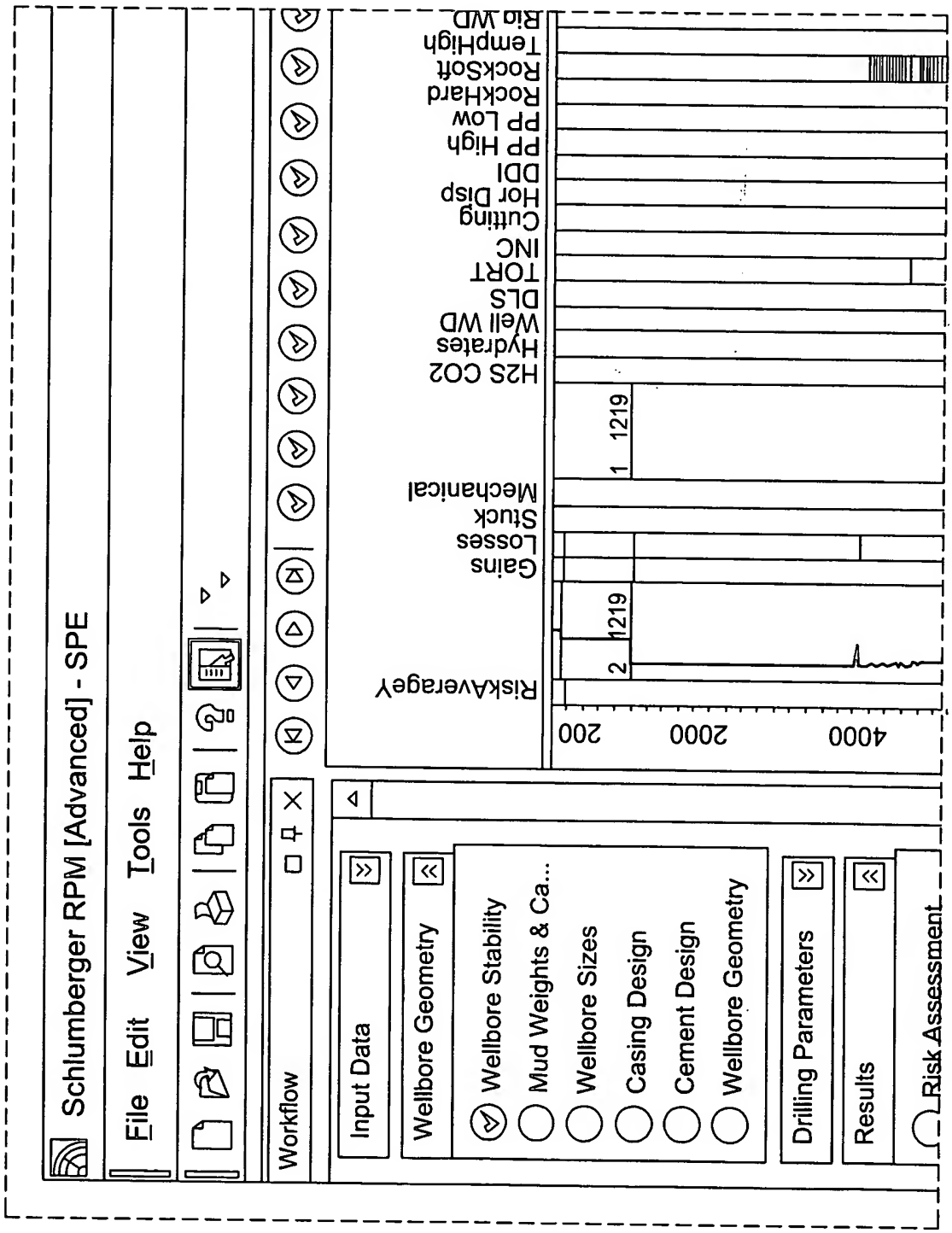

Schlumberger RPM [Advanced] - SPE
File Edit View Tools Help
Workflow
Input Data
Wellbore Geometry
Wellbore Stability
Mud Weights & Ca...
Wellbore Sizes
Casing Design
Cement Design
Wellbore Geometry
Drilling Parameters
Results
Risk Assessment
RiskAverage
Gains
Losses
Stuck
Mechanical
H2S CO2
Hydrates
Well WD
DLS
TORT
INC
Cutting
Hor Disp
DDI
PP High
PP Low
RockHard
RockSoft
TempHigh
Rig WD
4000
2000
200
1219
1
1219
2

FIG. 4A

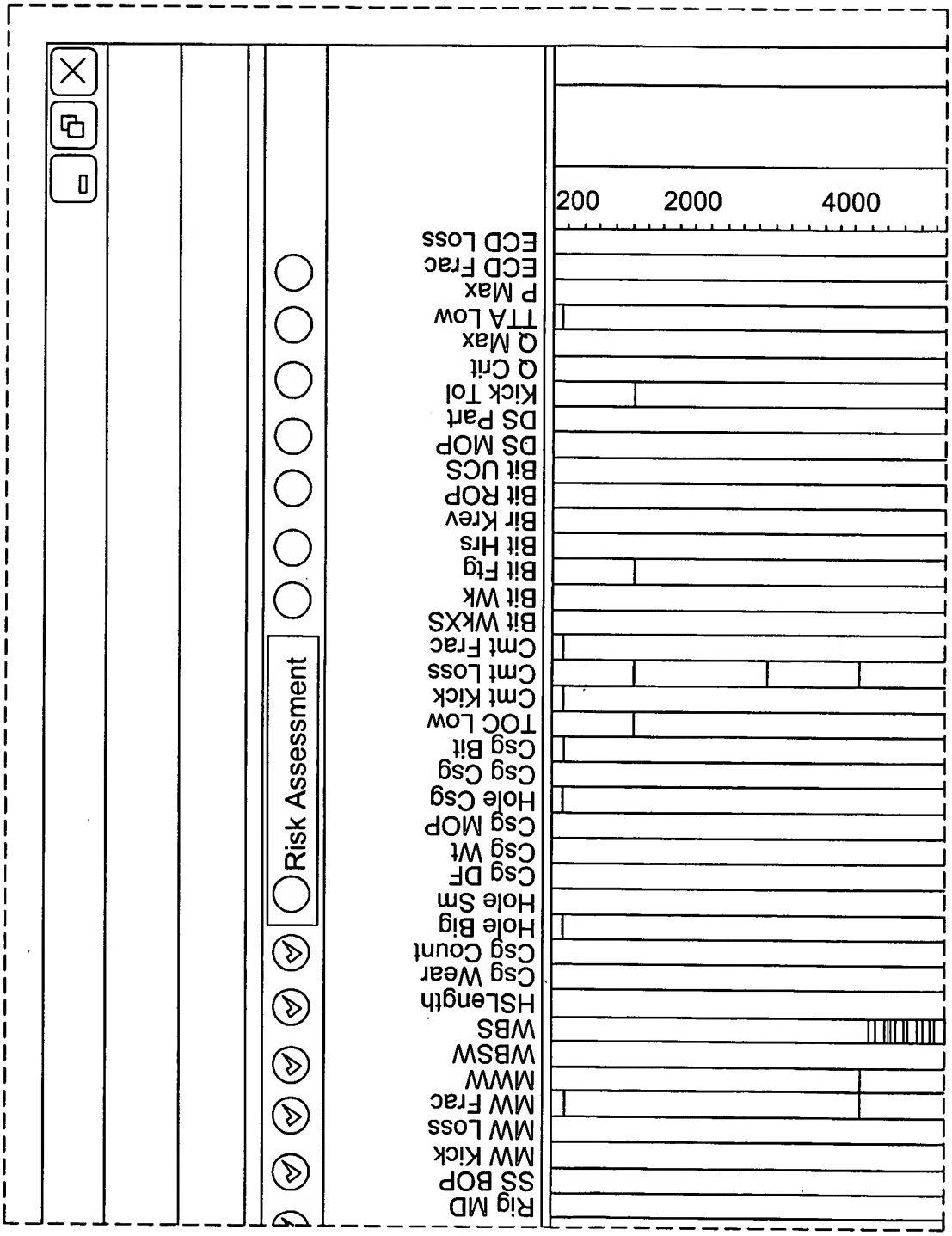

Risk Assessment
200
2000
4000
Rig MD
SS BOP
MW Kick
MW Loss
MW Frac
MWW
WBSW
WBS
HSLength
Csg Wear
Csg Count
Hole Big
Hole Sm
Csg DF
Csg Wt
Csg MOP
Hole Csg
Csg Csg
Csg Bit
TOC Low
Cmt Kick
Cmt Loss
Cmt Frac
Bit WkXS
Bit Wk
Bit Ftg
Bit Hrs
Bir Krev
Bit ROP
Bit UCS
DS MOP
DS Part
Kick Tol
Q Crit
Q Max
TTA Low
P Max
ECD Frac
ECD Loss

FIG. 4B

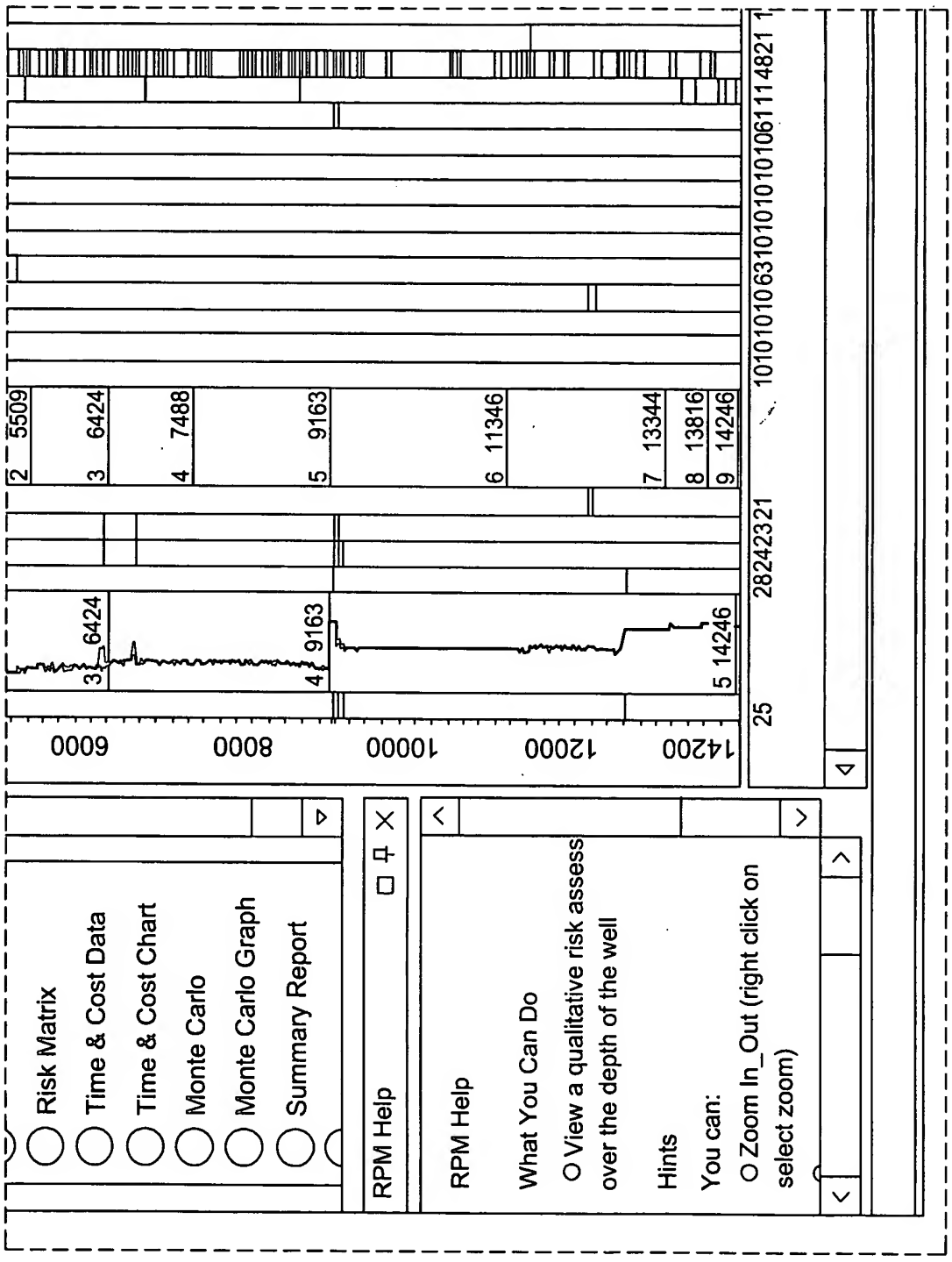

Risk Matrix
Time & Cost Data
Time & Cost Chart
Monte Carlo
Monte Carlo Graph
Summary Report
RPM Help
RPM Help
What You Can Do
O View a qualitative risk assess over the depth of the well
Hints
You can:
O Zoom In_Out (right click on select zoom)
6000
8000
10000
12000
14200
2 5509
3 6424
4 7488
5 9163
6 11346
7 13344
8 13816
9 14246
3 6424
4 9163
5 14246
25
28242321
10101010631010101061114821 1

FIG. 4C

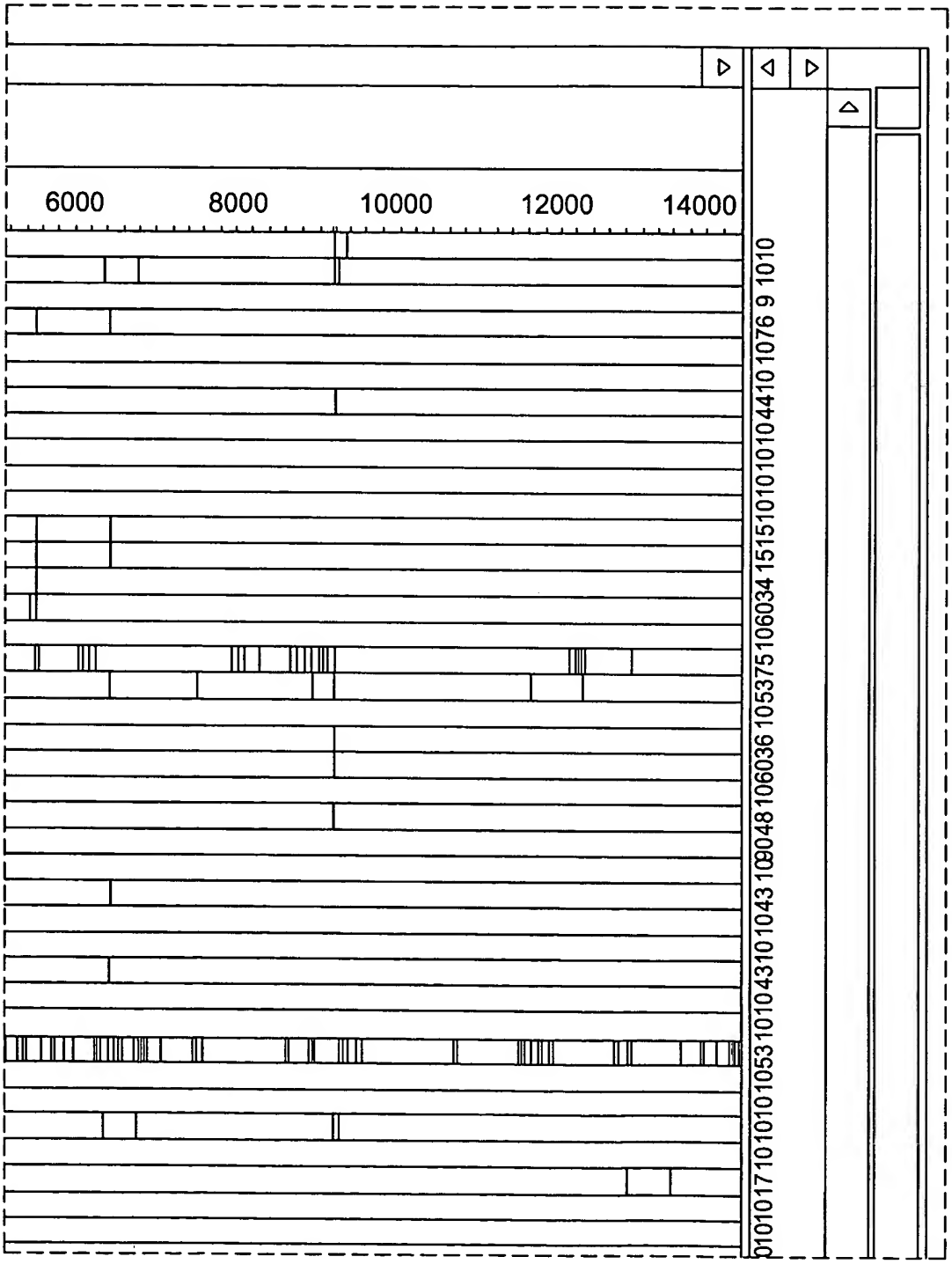


FIG. 4D

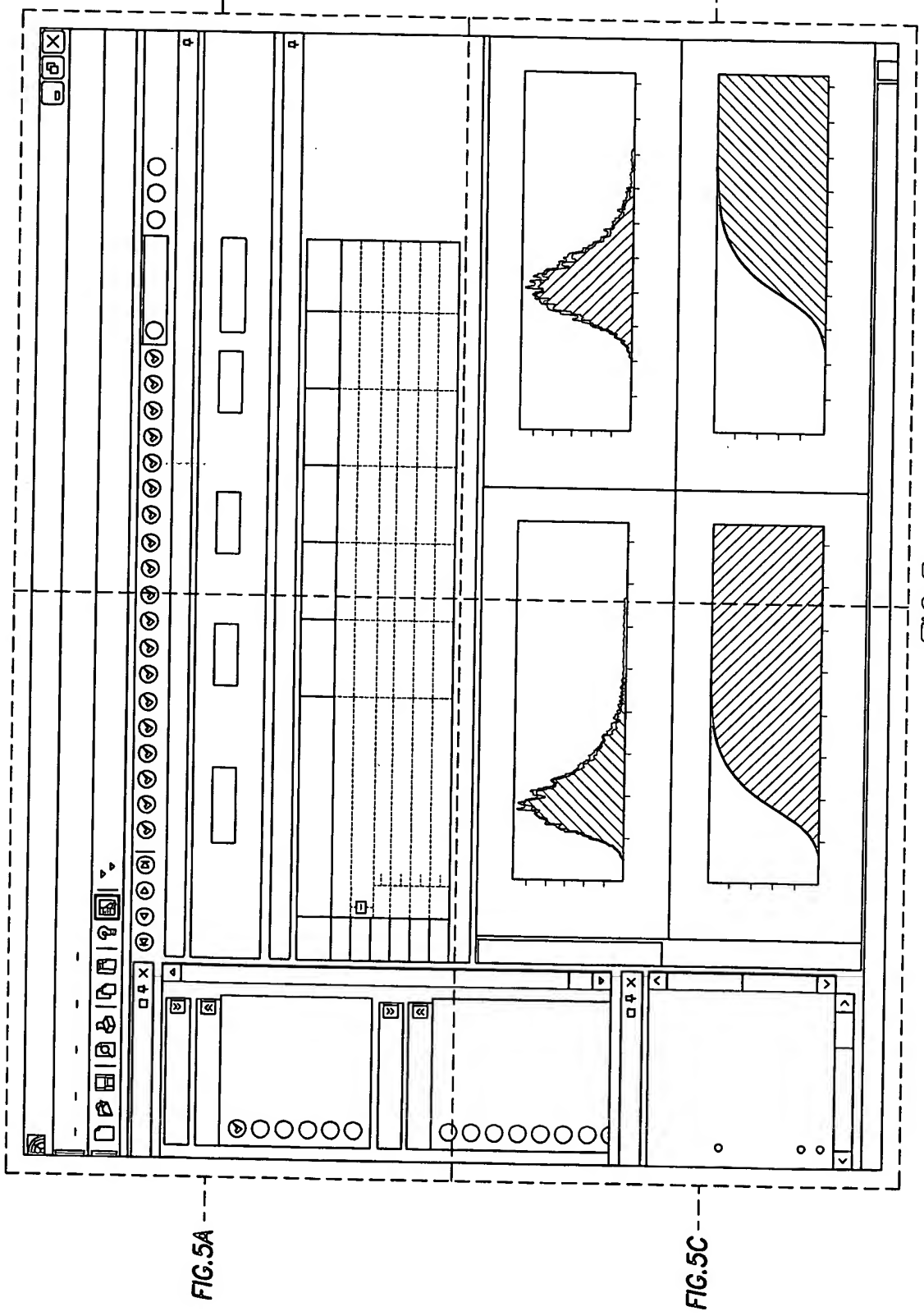


FIG.5

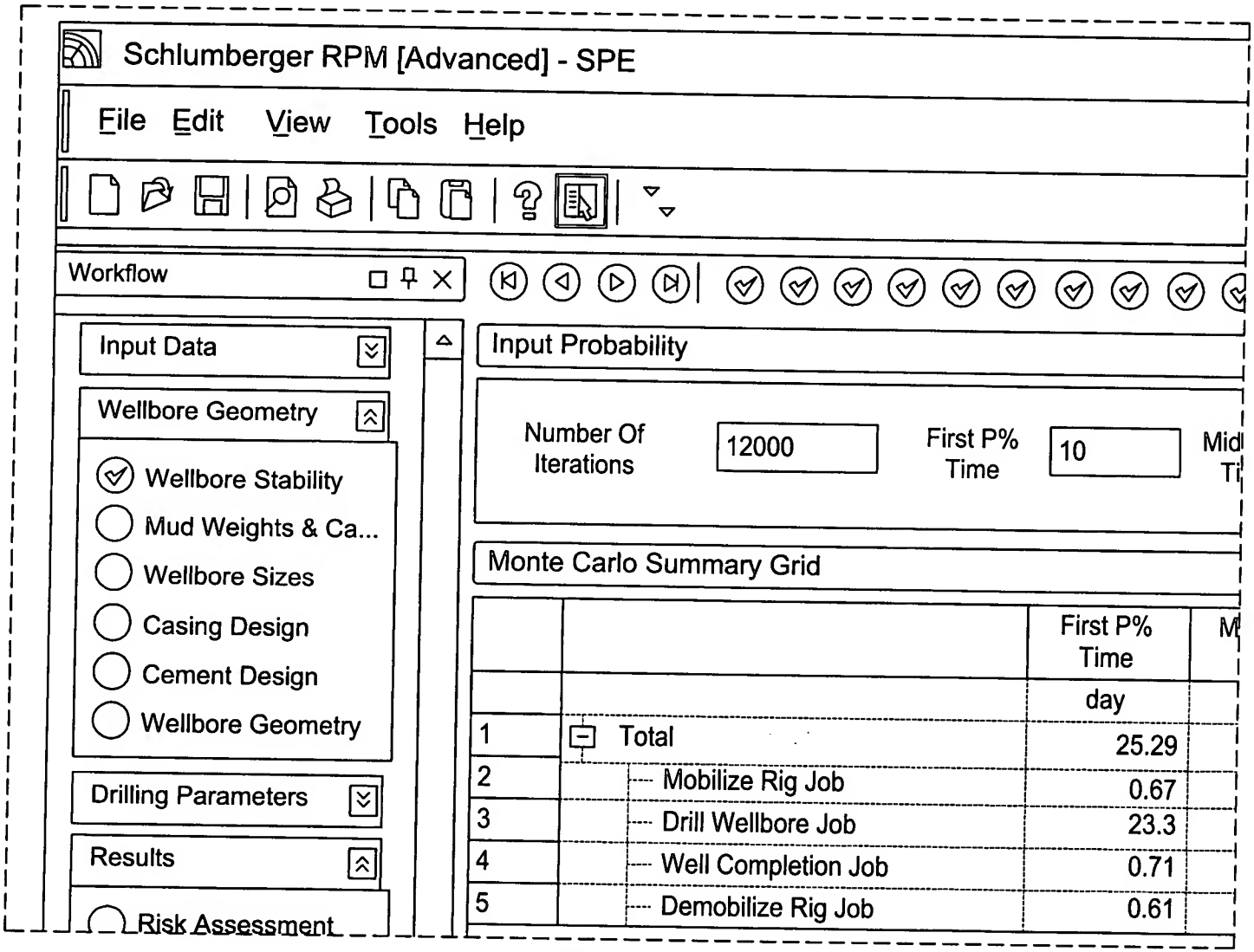

Schlumberger RPM [Advanced] - SPE
File Edit View Tools Help
Workflow
Input Data
Wellbore Geometry
Wellbore Stability
Mud Weights & Ca...
Wellbore Sizes
Casing Design
Cement Design
Wellbore Geometry
Drilling Parameters
Results
Risk Assessment
Input Probability
Number Of Iterations
12000
First P% Time
10
Monte Carlo Summary Grid
First P% Time
day
1 Total 25.29
2 Mobilize Rig Job 0.67
3 Drill Wellbore Job 23.3
4 Well Completion Job 0.71
5 Demobilize Rig Job 0.61

FIG.5A

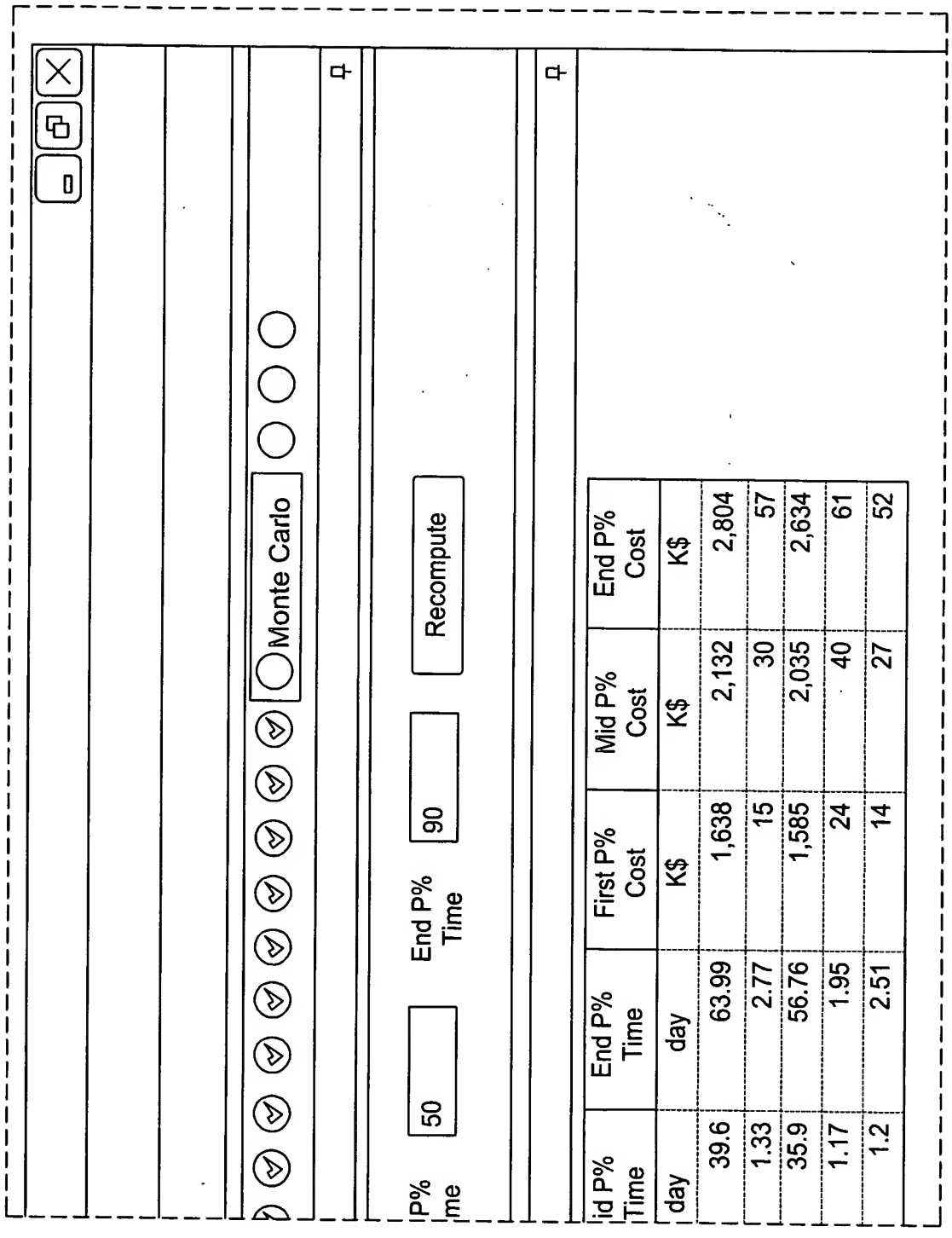

Monte Carlo
End P% Time
50
90
Recompute
id P% Time
End P% Time
First P% Cost
Mid P% Cost
End P% Cost
day
day
K$
K$
K$
39.6
63.99
1,638
2,132
2,804
1.33
2.77
15
30
57
35.9
56.76
1,585
2,035
2,634
1.17
1.95
24
40
61
1.2
2.51
14
27
52

FIG.5B

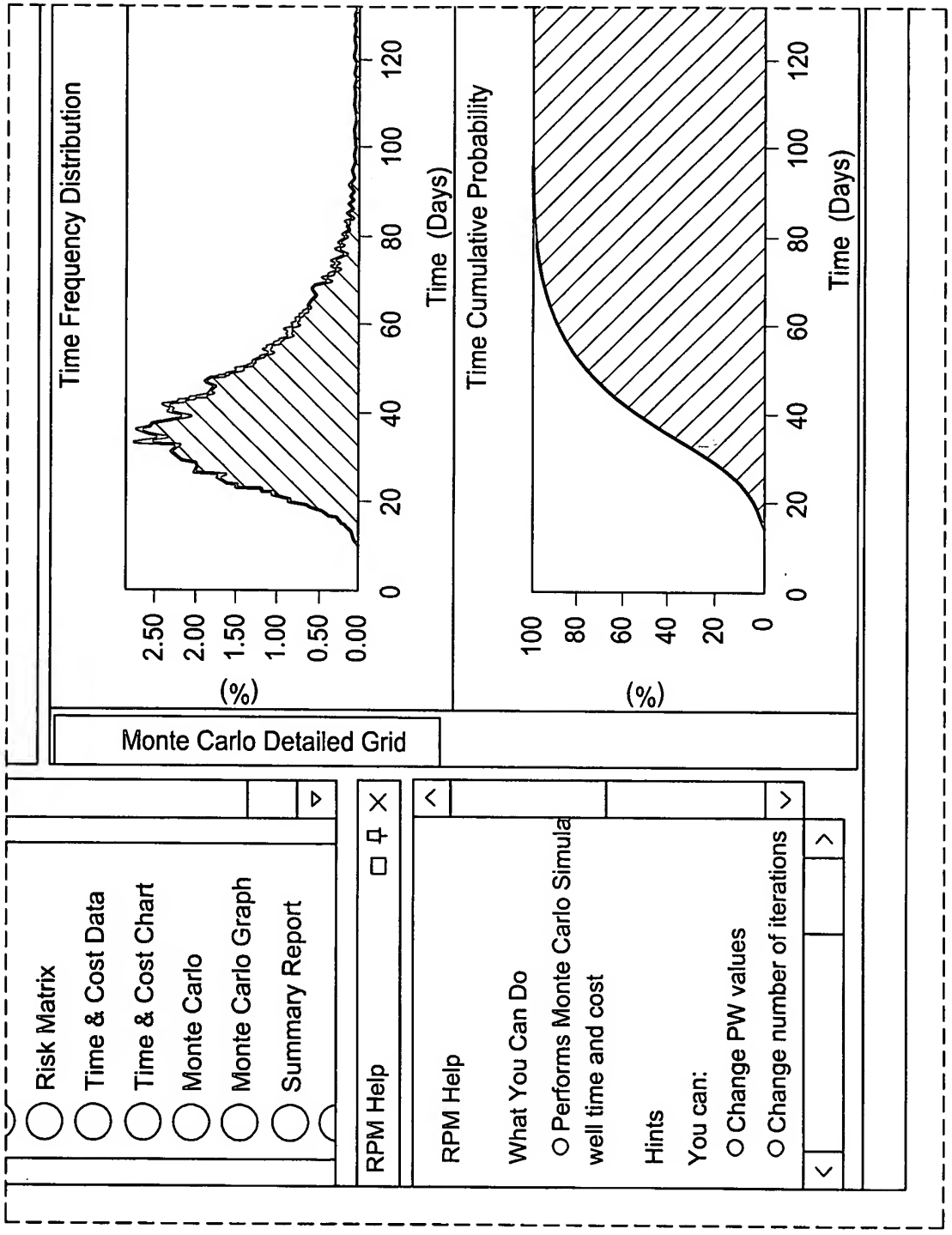

Risk Matrix
Time & Cost Data
Time & Cost Chart
Monte Carlo
Monte Carlo Graph
Summary Report
RPM Help
RPM Help
What You Can Do
O Performs Monte Carlo Simula
well time and cost
Hints
You can:
O Change PW values
O Change number of iterations
Monte Carlo Detailed Grid
Time Frequency Distribution
2.50
2.00
1.50
1.00
0.50
0.00
(%)
0
20
40
60
80
100
120
Time (Days)
Time Cumulative Probability
100
80
60
40
20
0
(%)
0
20
40
60
80
100
120
Time (Days)

FIG.5C

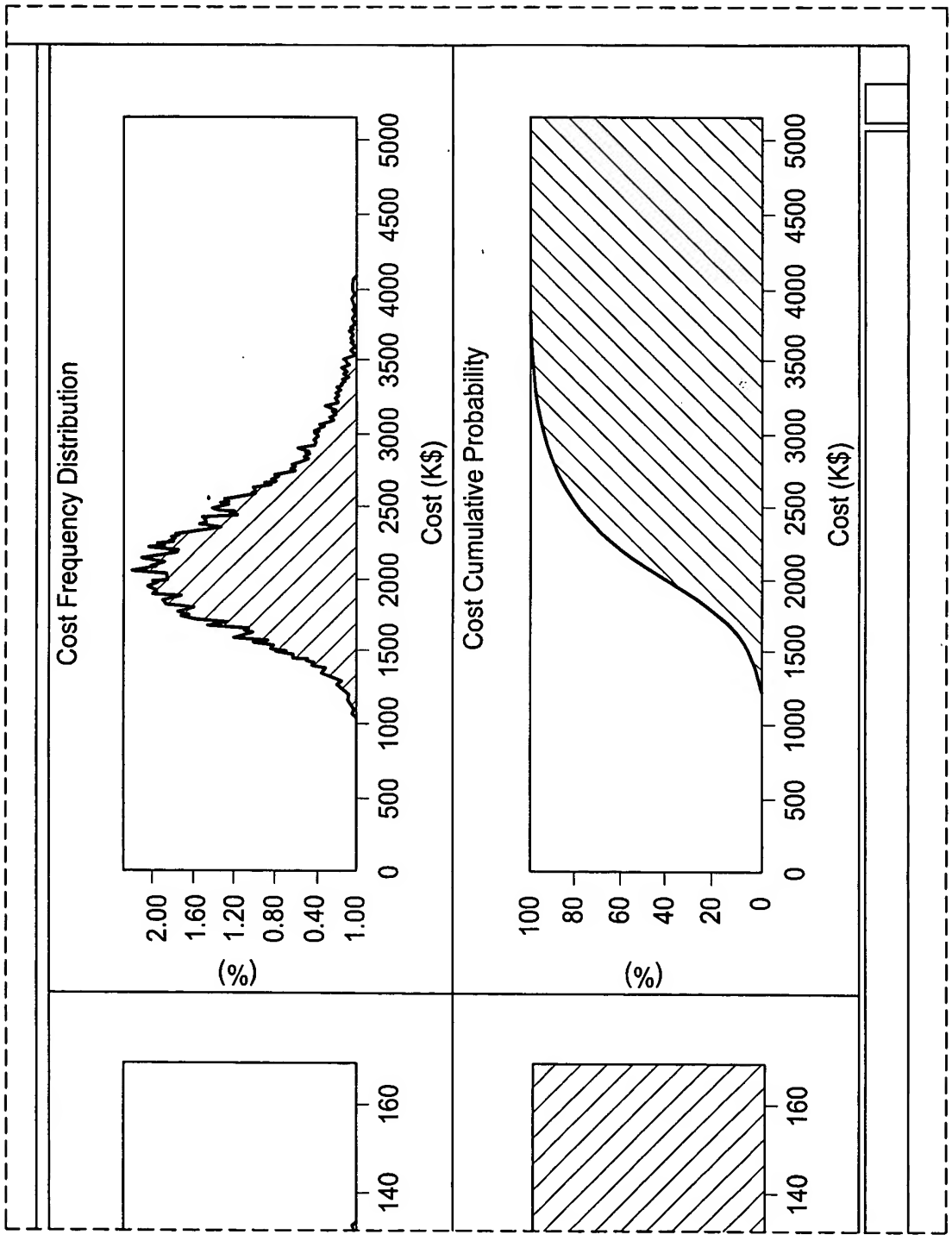

Cost Frequency Distribution
2.00
1.60
1.20
0.80
0.40
1.00
(%)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
Cost (K$)
Cost Cumulative Probability
100
80
60
40
20
0
(%)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
Cost (K$)
140
160
140
160

FIG.5D

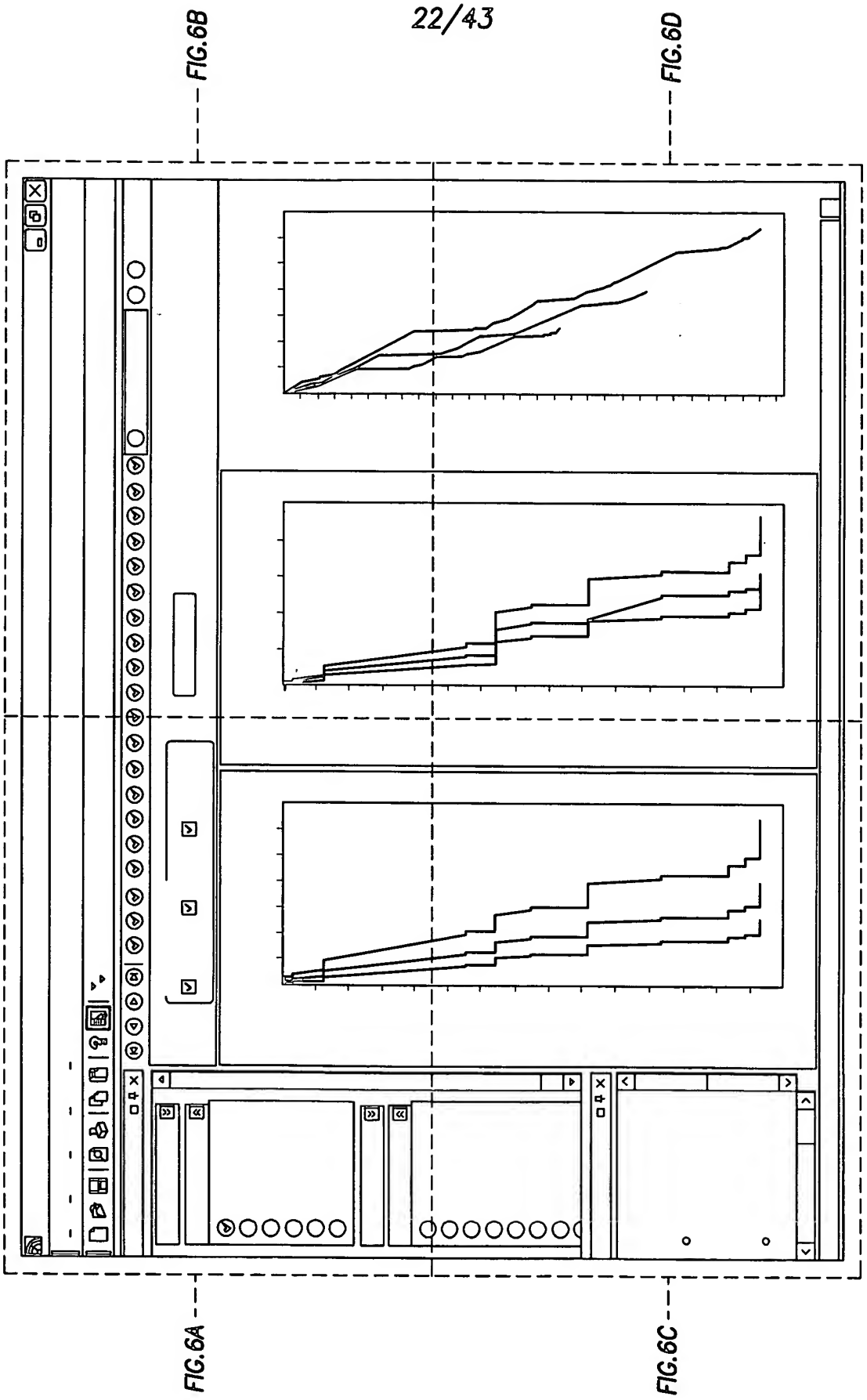


FIG.6

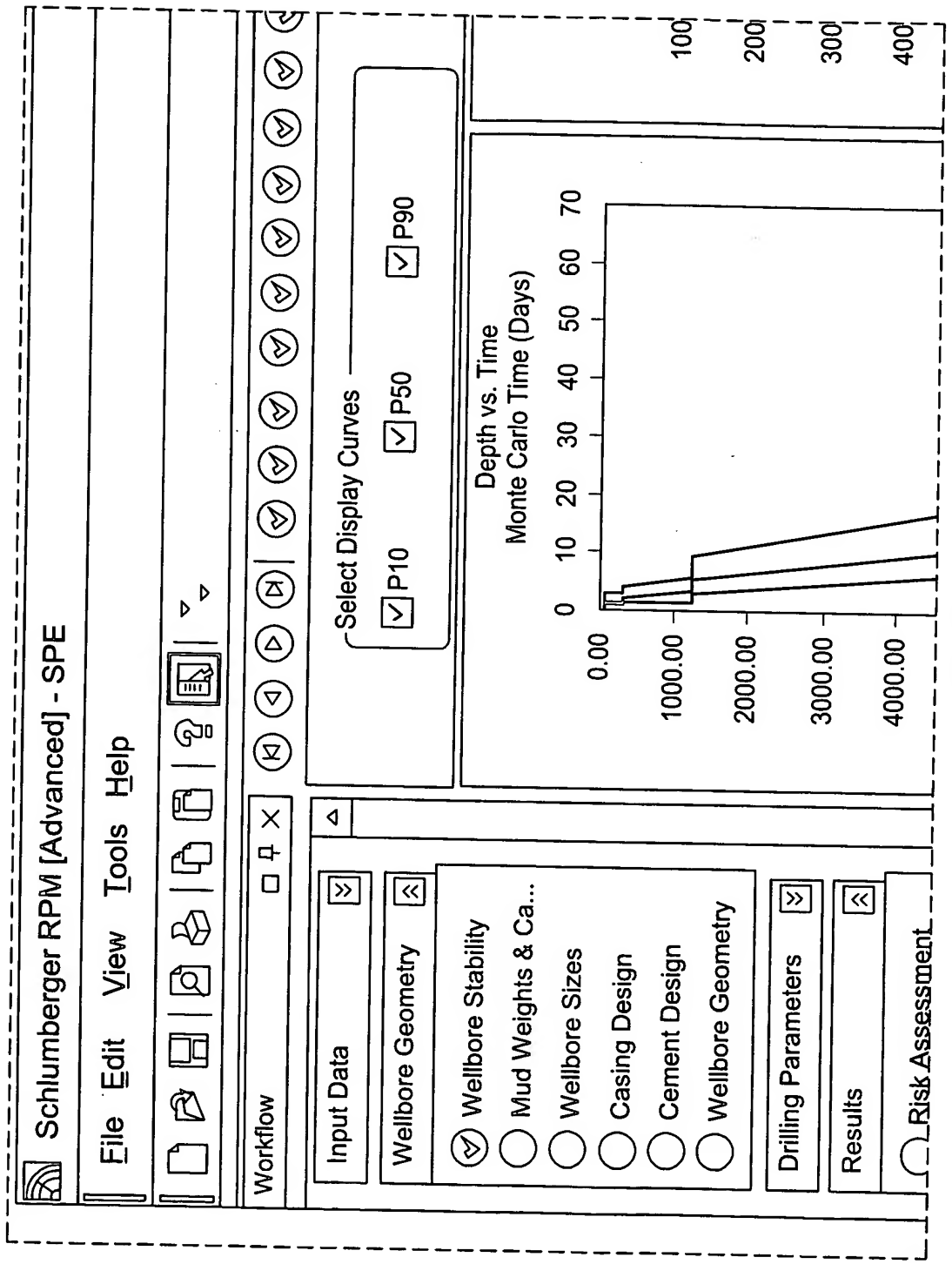

Schlumberger RPM [Advanced] - SPE
File Edit View Tools Help
Workflow
Input Data
Wellbore Geometry
Wellbore Stability
Mud Weights & Ca...
Wellbore Sizes
Casing Design
Cement Design
Wellbore Geometry
Drilling Parameters
Results
Risk Assessment
Select Display Curves
P10
P50
P90
Depth vs. Time
Monte Carlo Time (Days)
0.00
1000.00
2000.00
3000.00
4000.00
0
10
20
30
40
50
60
70
100
200
300
400

FIG. 6A

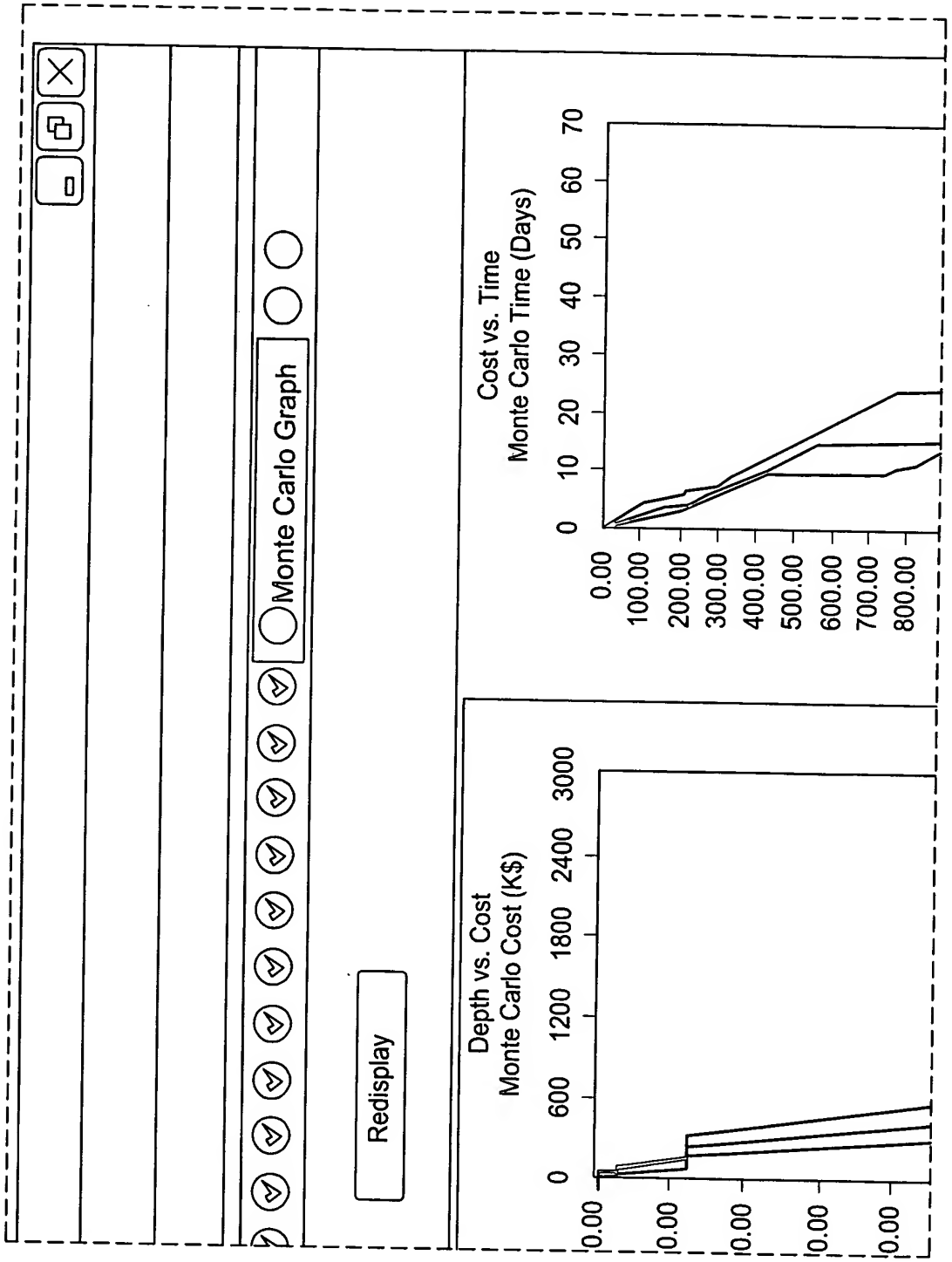

Monte Carlo Graph
Redisplay
Depth vs. Cost
Monte Carlo Cost (K$)
0
600
1200
1800
2400
3000
0.00
Cost vs. Time
Monte Carlo Time (Days)
0
10
20
30
40
50
60
70
0.00
100.00
200.00
300.00
400.00
500.00
600.00
700.00
800.00

FIG.6B

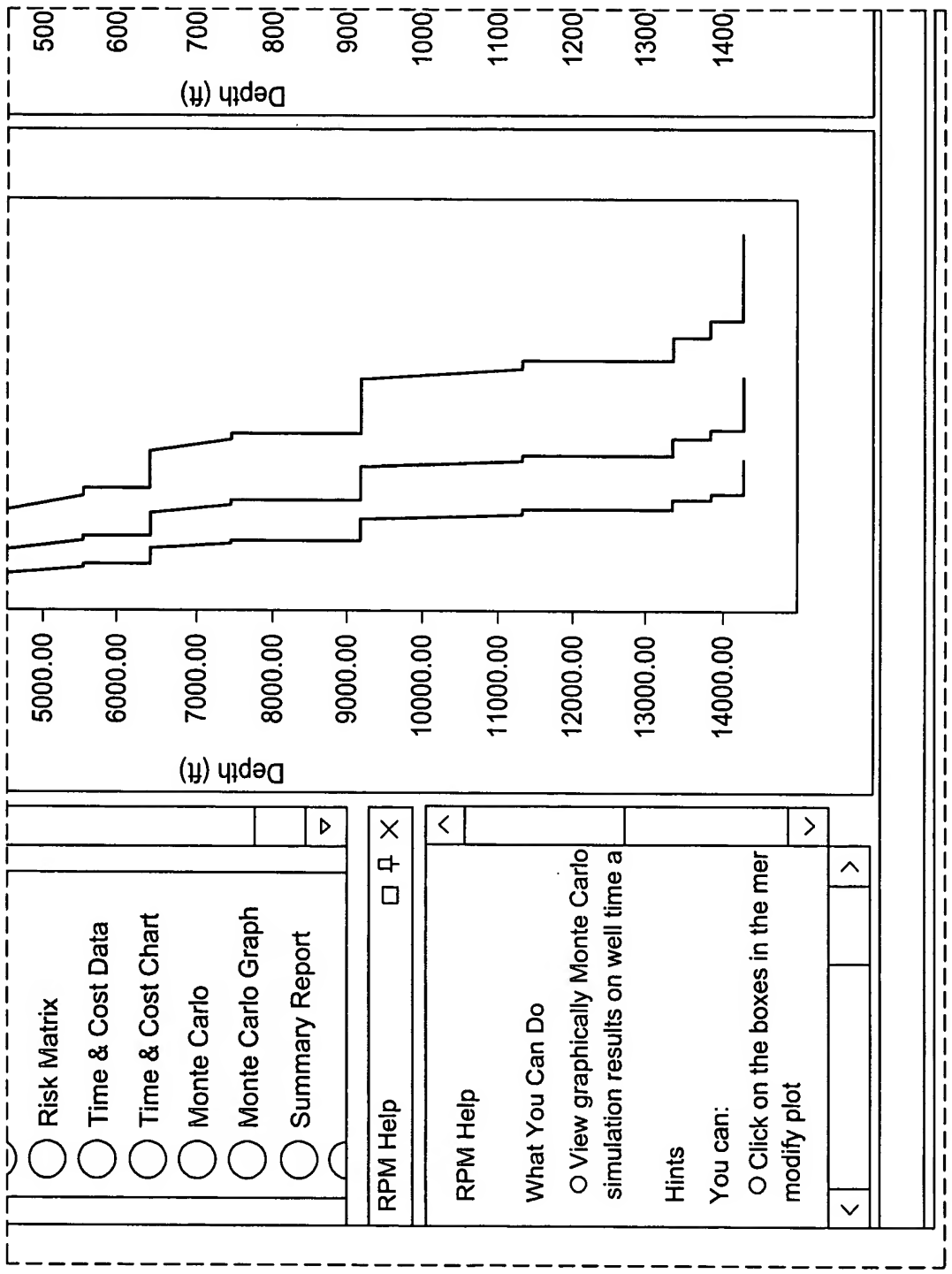

Risk Matrix
Time & Cost Data
Time & Cost Chart
Monte Carlo
Monte Carlo Graph
Summary Report
RPM Help
RPM Help
What You Can Do
View graphically Monte Carlo simulation results on well time a
Hints
You can:
Click on the boxes in the mer modify plot
Depth (ft)
5000.00
6000.00
7000.00
8000.00
9000.00
10000.00
11000.00
12000.00
13000.00
14000.00
Depth (ft)
500
600
700
800
900
1000
1100
1200
1300
1400

FIG. 6C

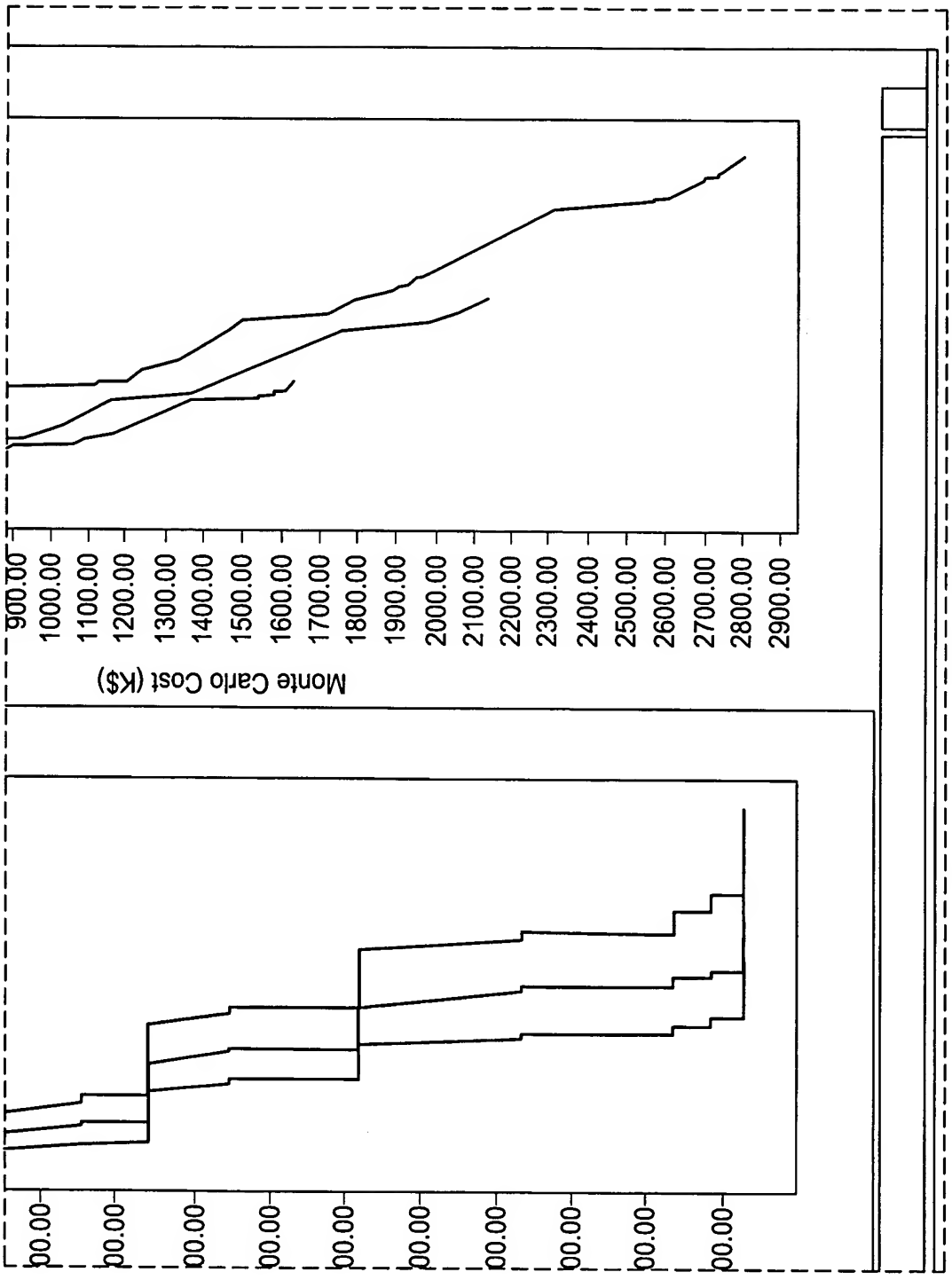

Monte Carlo Cost (K$)
900.00
1000.00
1100.00
1200.00
1300.00
1400.00
1500.00
1600.00
1700.00
1800.00
1900.00
2000.00
2100.00
2200.00
2300.00
2400.00
2500.00
2600.00
2700.00
2800.00
2900.00

FIG.6D

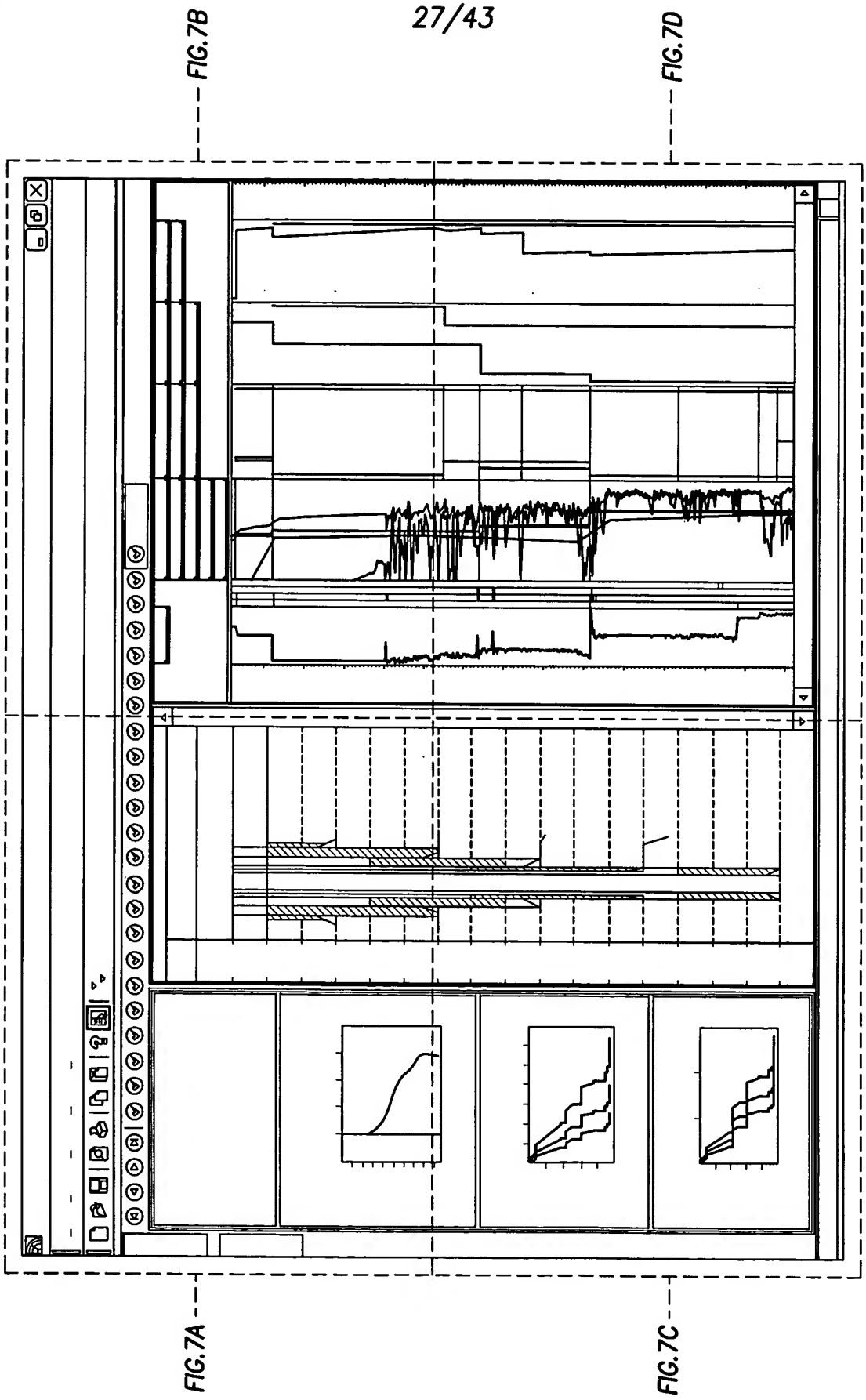


FIG.7

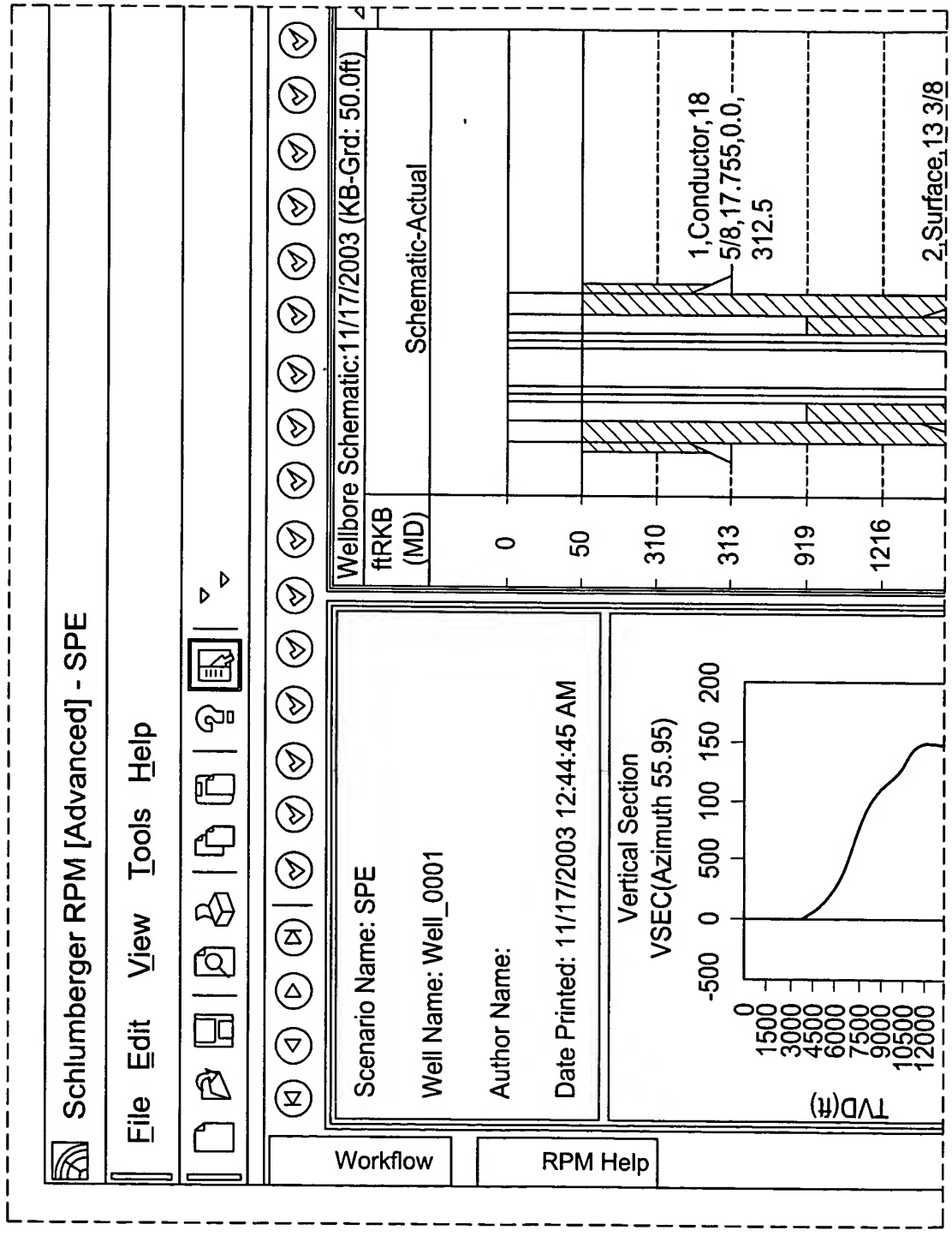

Schlumberger RPM [Advanced] - SPE
File Edit View Tools Help
Workflow
RPM Help
Scenario Name: SPE
Well Name: Well_0001
Author Name:
Date Printed: 11/17/2003 12:44:45 AM
Vertical Section
VSEC(Azimuth 55.95)
-500 0 500 100 150 200
TVD(ft)
0 1500 3000 4500 6000 7500 9000 10500 12000
Wellbore Schematic:11/17/2003 (KB-Grd: 50.0ft)
ftRKB (MD)
Schematic-Actual
0 50 310 313 919 1216
1,Conductor,18
5/8,17.755,0.0,
312.5
2,Surface,13 3/8

FIG. 7A

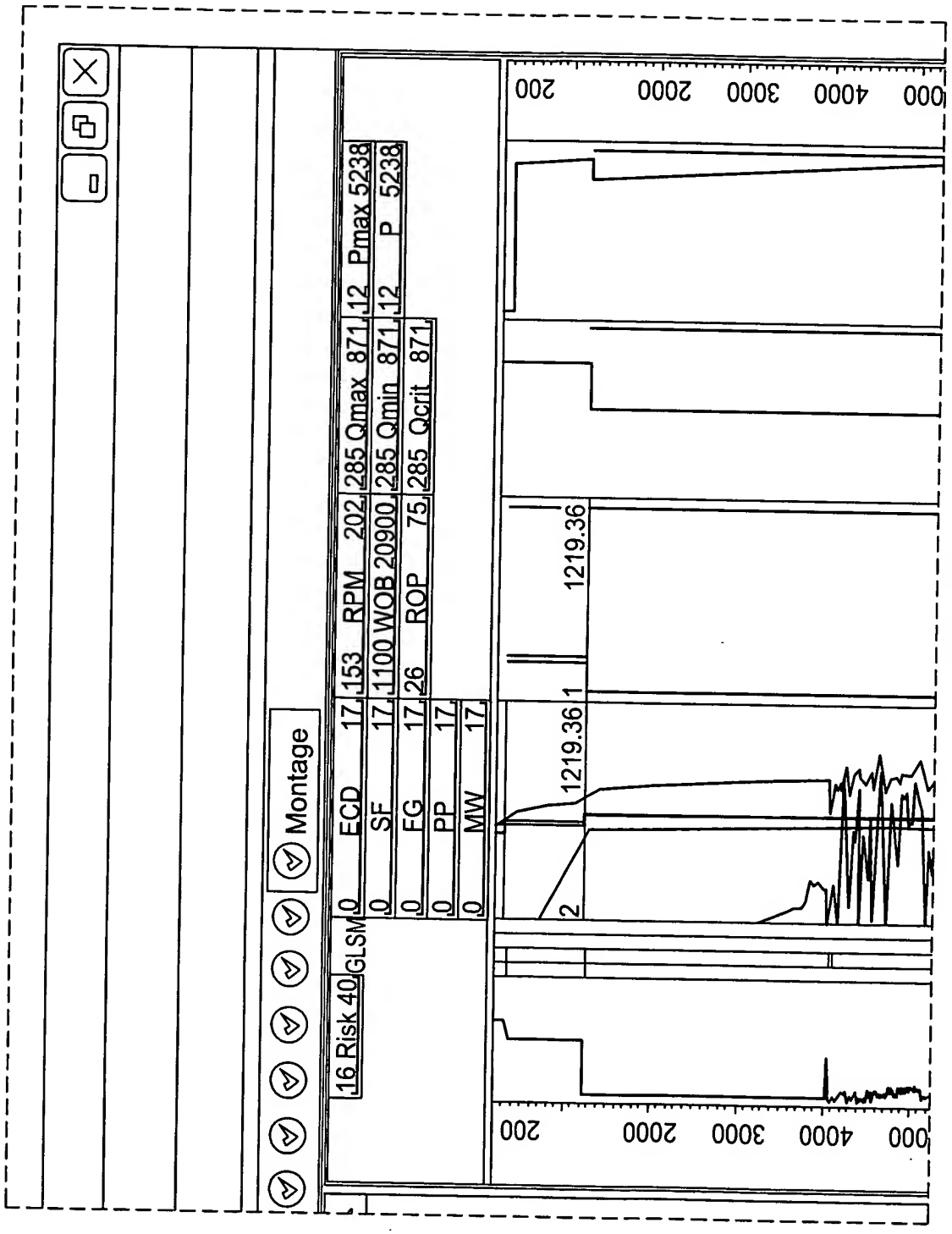

Montage
16 Risk 40
GLSM
0 ECD 17
0 SF 17
0 FG 17
0 PP 17
0 MW 17
153 RPM 202
1100 WOB 20900
26 ROP 75
285 Qmax 871
285 Qmin 871
285 Qcrit 871
12 Pmax 5238
12 P 5238
1219.36
1219.36
2
200
2000
3000
4000
200
2000
3000
4000

FIG.7B

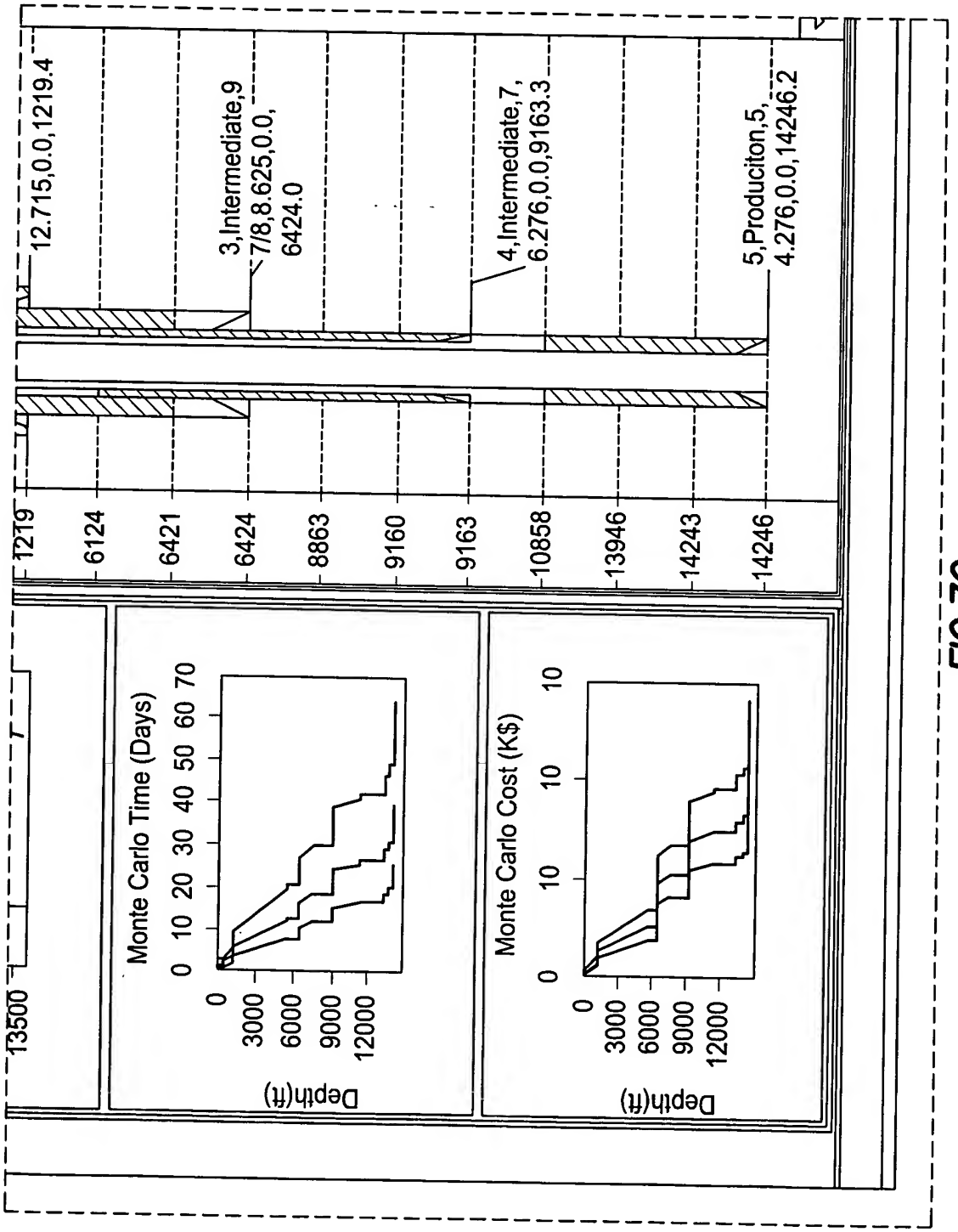

12.715,0.0,1219.4
3,Intermediate,9
7/8,8.625,0.0,
6424.0
4,Intermediate,7,
6.276,0.0,9163.3
5,Produciton,5,
4.276,0.0,14246.2
1219
6124
6421
6424
8863
9160
9163
10858
13946
14243
14246
13500
Monte Carlo Time (Days)
0 10 20 30 40 50 60 70
0
3000
6000
9000
12000
Depth(ft)
Monte Carlo Cost (K$)
0 10 10 10 10
0
3000
6000
9000
12000
Depth(ft)

FIG.7C

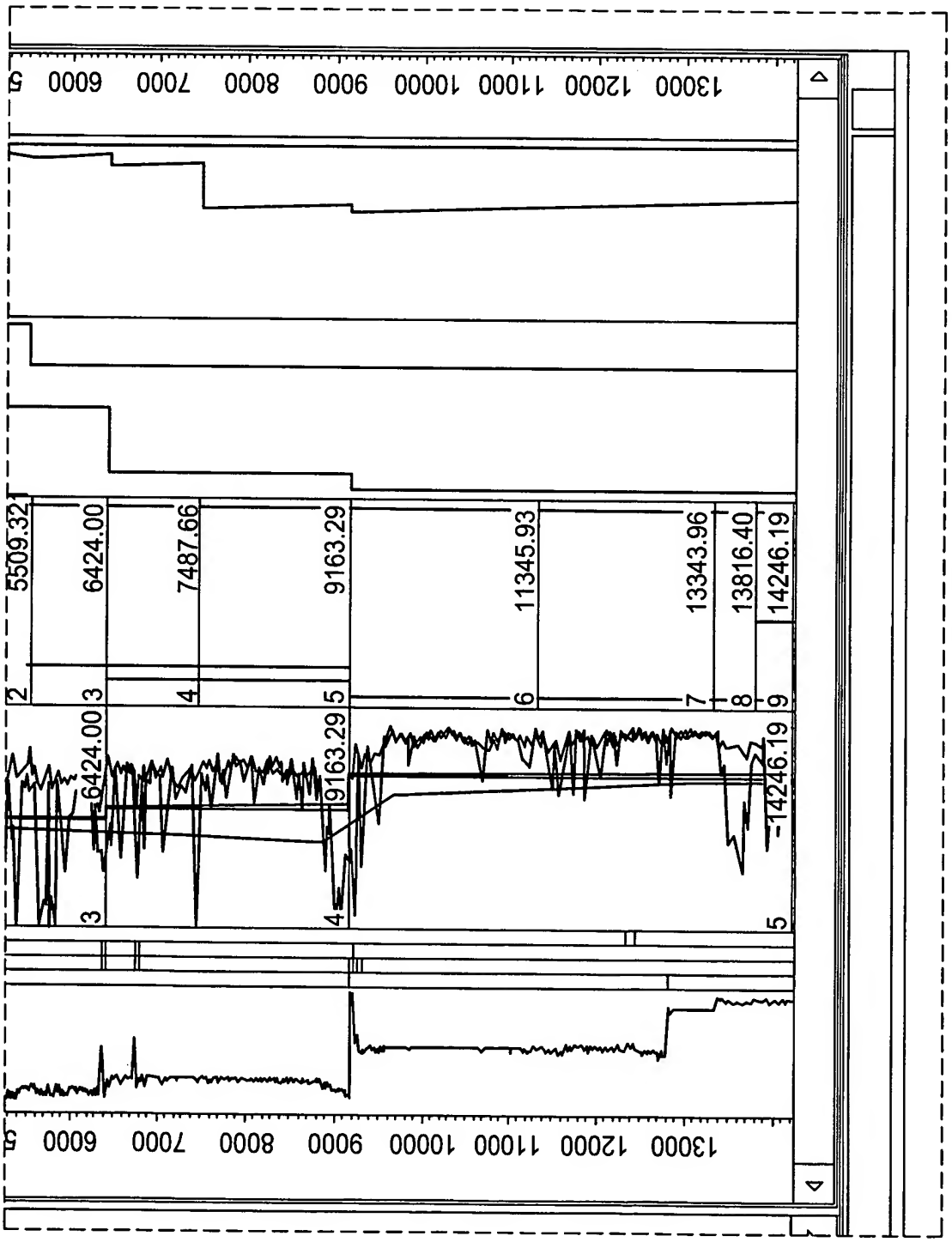

5000
6000
7000
8000
9000
10000
11000
12000
13000
5509.32
6424.00
7487.66
9163.29
11345.93
13343.96
13816.40
14246.19
2
3
4
5
6
7
8
9
-6424.00
-9163.29
-14246.19

FIG.7D

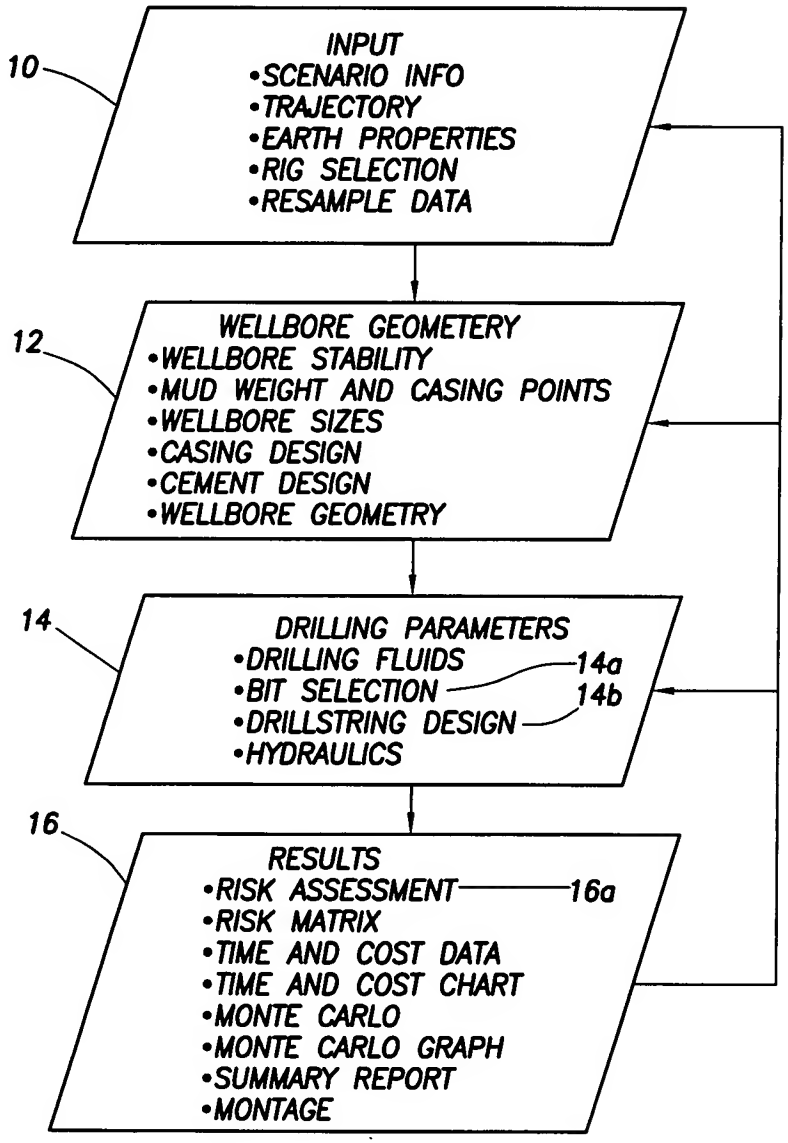

10
INPUT
•SCENARIO INFO
•TRAJECTORY
•EARTH PROPERTIES
•RIG SELECTION
•RESAMPLE DATA
12
WELLBORE GEOMETERY
•WELLBORE STABILITY
•MUD WEIGHT AND CASING POINTS
•WELLBORE SIZES
•CASING DESIGN
•CEMENT DESIGN
•WELLBORE GEOMETRY
14
DRILLING PARAMETERS
•DRILLING FLUIDS
•BIT SELECTION
•DRILLSTRING DESIGN
•HYDRAULICS
14a
14b
16
RESULTS
•RISK ASSESSMENT
•RISK MATRIX
•TIME AND COST DATA
•TIME AND COST CHART
•MONTE CARLO
•MONTE CARLO GRAPH
•SUMMARY REPORT
•MONTAGE
16a

FIG.8

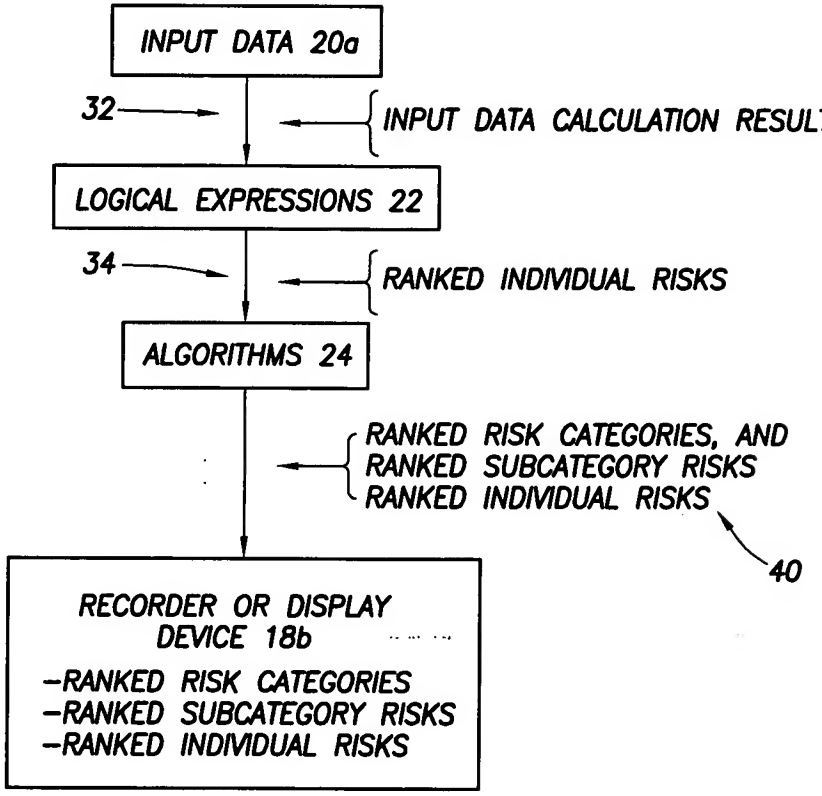

INPUT DATA 20a
32
INPUT DATA CALCULATION RESULT
LOGICAL EXPRESSIONS 22
34
RANKED INDIVIDUAL RISKS
ALGORITHMS 24
RANKED RISK CATEGORIES, AND
RANKED SUBCATEGORY RISKS
RANKED INDIVIDUAL RISKS
40
RECORDER OR DISPLAY
DEVICE 18b
-RANKED RISK CATEGORIES
-RANKED SUBCATEGORY RISKS
-RANKED INDIVIDUAL RISKS

FIG.11

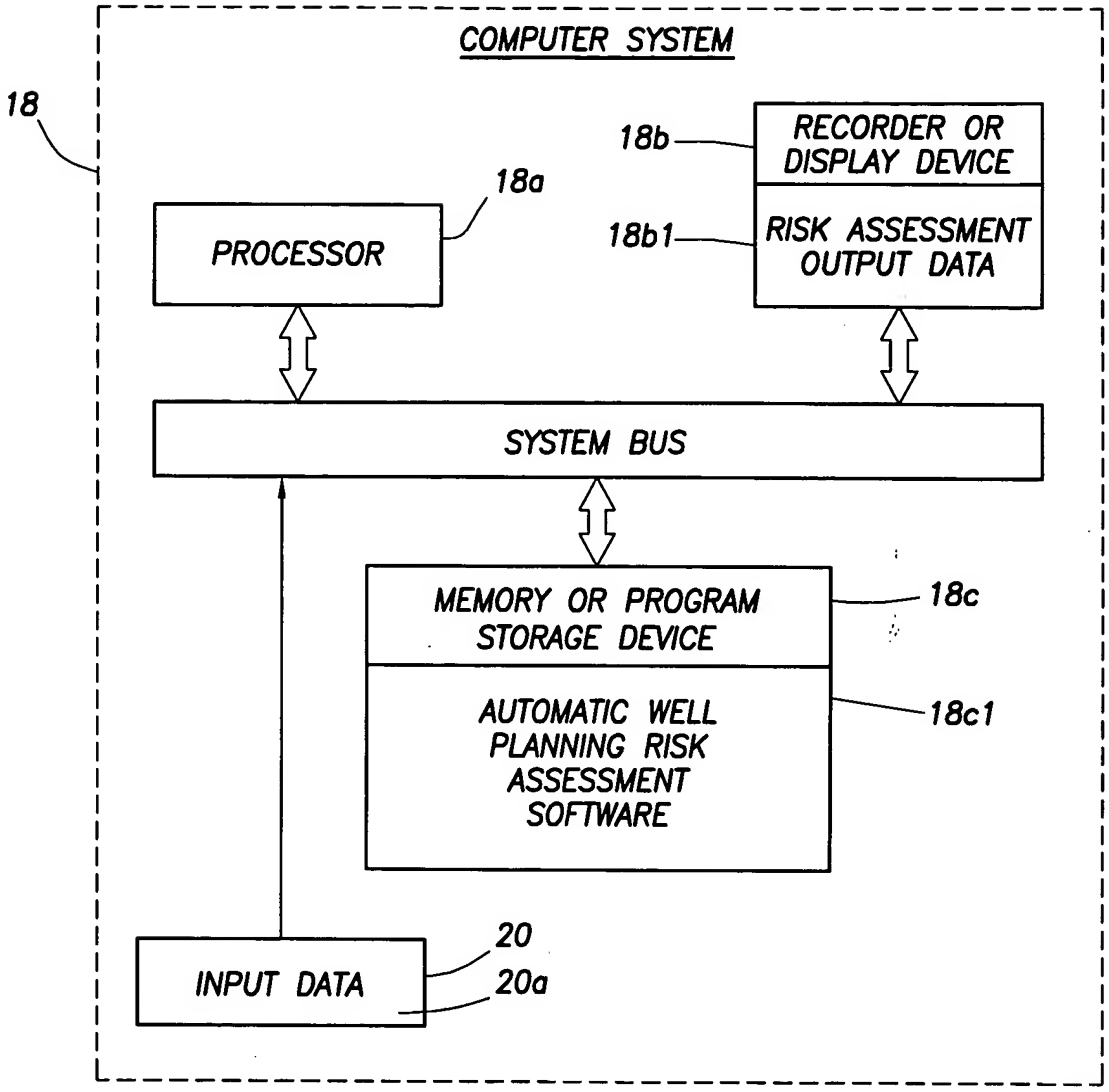

COMPUTER SYSTEM
18
18b
RECORDER OR DISPLAY DEVICE
18a
PROCESSOR
18b1
RISK ASSESSMENT OUTPUT DATA
SYSTEM BUS
MEMORY OR PROGRAM STORAGE DEVICE
18c
AUTOMATIC WELL PLANNING RISK ASSESSMENT SOFTWARE
18c1
20
INPUT DATA
20a

FIG.9A

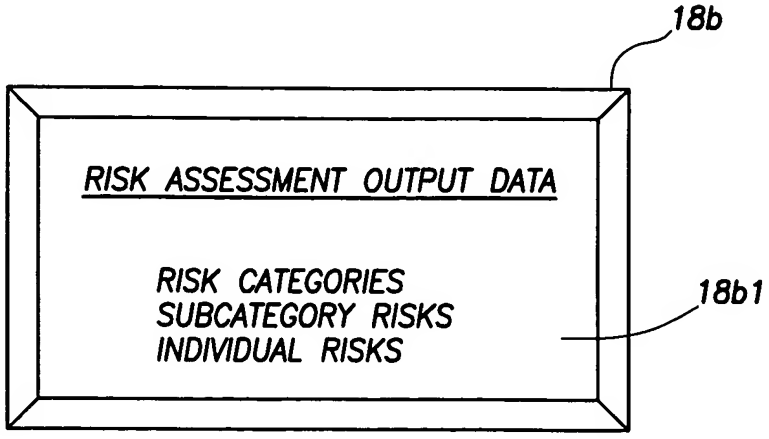

18b
RISK ASSESSMENT OUTPUT DATA
RISK CATEGORIES
SUBCATEGORY RISKS
INDIVIDUAL RISKS
18b1

FIG.9B

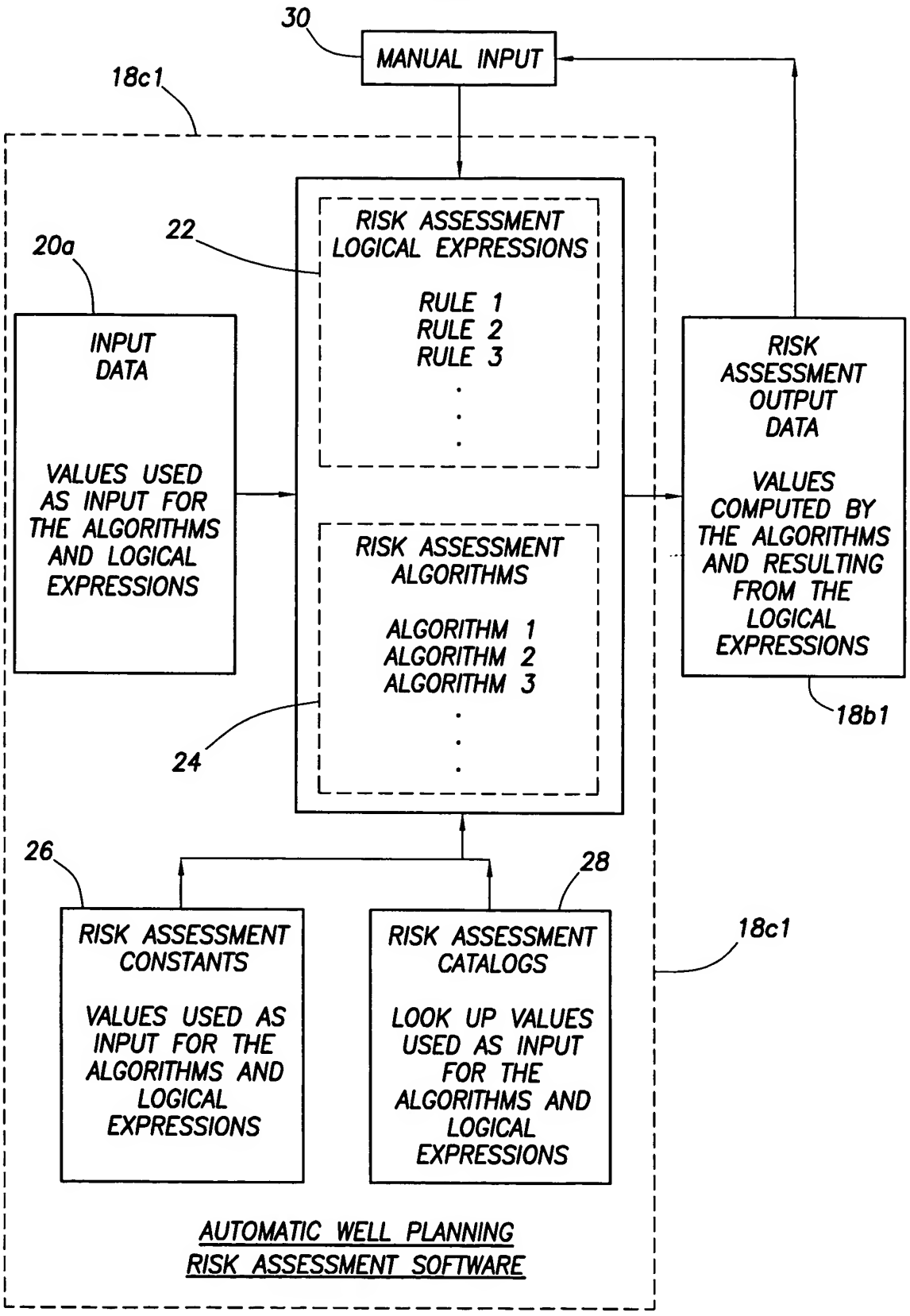

30
MANUAL INPUT
18c1
22
RISK ASSESSMENT LOGICAL EXPRESSIONS
RULE 1
RULE 2
RULE 3
20a
INPUT DATA
VALUES USED AS INPUT FOR THE ALGORITHMS AND LOGICAL EXPRESSIONS
RISK ASSESSMENT ALGORITHMS
ALGORITHM 1
ALGORITHM 2
ALGORITHM 3
24
RISK ASSESSMENT OUTPUT DATA
VALUES COMPUTED BY THE ALGORITHMS AND RESULTING FROM THE LOGICAL EXPRESSIONS
18b1
26
28
RISK ASSESSMENT CONSTANTS
VALUES USED AS INPUT FOR THE ALGORITHMS AND LOGICAL EXPRESSIONS
RISK ASSESSMENT CATALOGS
LOOK UP VALUES USED AS INPUT FOR THE ALGORITHMS AND LOGICAL EXPRESSIONS
18c1
AUTOMATIC WELL PLANNING
RISK ASSESSMENT SOFTWARE

FIG. 10

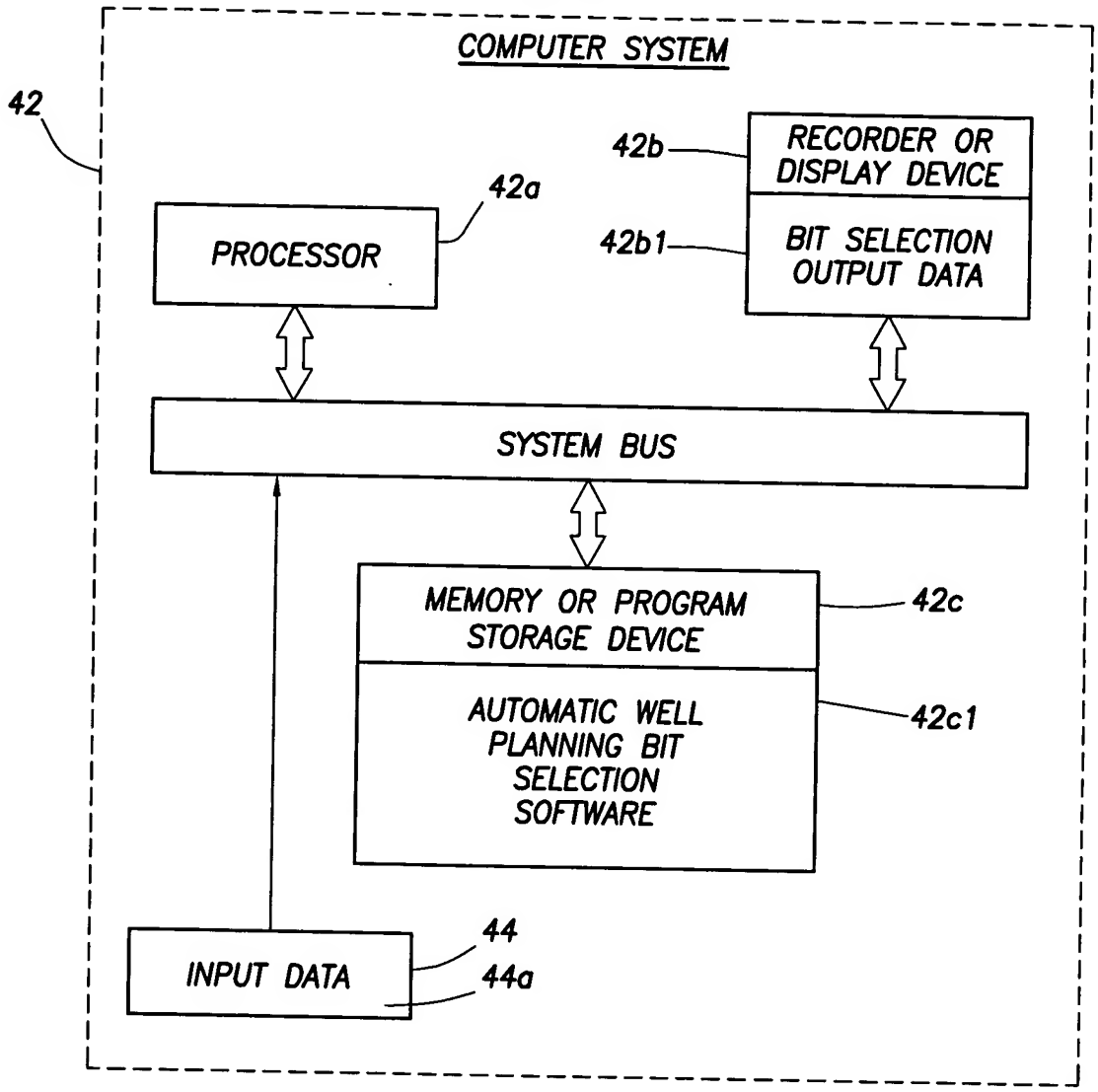

COMPUTER SYSTEM
42
42b
RECORDER OR DISPLAY DEVICE
42a
PROCESSOR
42b1
BIT SELECTION OUTPUT DATA
SYSTEM BUS
MEMORY OR PROGRAM STORAGE DEVICE
42c
AUTOMATIC WELL PLANNING BIT SELECTION SOFTWARE
42c1
44
INPUT DATA
44a

FIG. 12

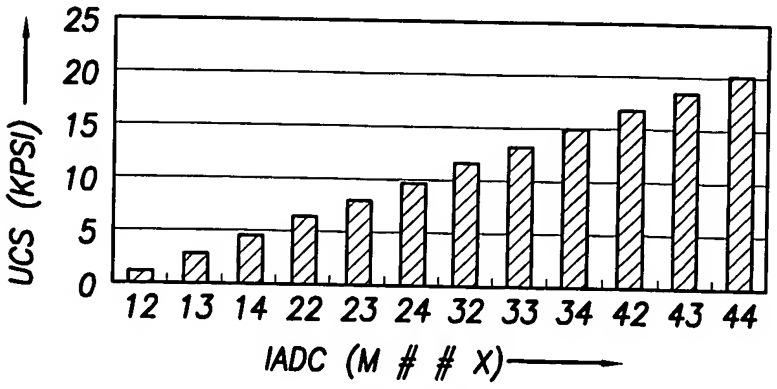

UCS (KPSI)
25
20
15
10
5
0
12 13 14 22 23 24 32 33 34 42 43 44
IADC (M # # X)

FIG. 16

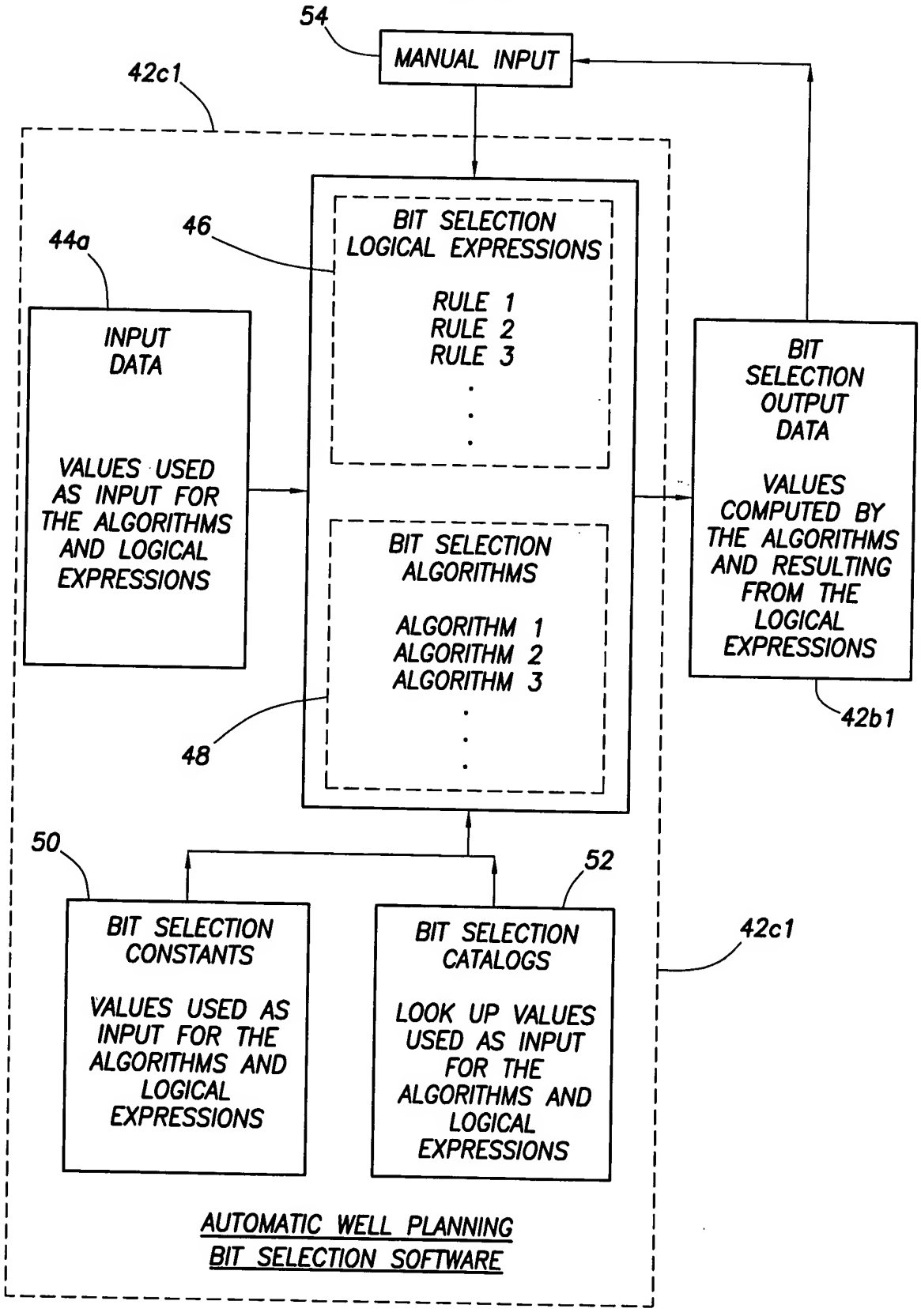

54
MANUAL INPUT
42c1
BIT SELECTION LOGICAL EXPRESSIONS
RULE 1
RULE 2
RULE 3
46
44a
INPUT DATA
VALUES USED AS INPUT FOR THE ALGORITHMS AND LOGICAL EXPRESSIONS
BIT SELECTION ALGORITHMS
ALGORITHM 1
ALGORITHM 2
ALGORITHM 3
48
BIT SELECTION OUTPUT DATA
VALUES COMPUTED BY THE ALGORITHMS AND RESULTING FROM THE LOGICAL EXPRESSIONS
42b1
50
52
BIT SELECTION CONSTANTS
VALUES USED AS INPUT FOR THE ALGORITHMS AND LOGICAL EXPRESSIONS
BIT SELECTION CATALOGS
LOOK UP VALUES USED AS INPUT FOR THE ALGORITHMS AND LOGICAL EXPRESSIONS
42c1
AUTOMATIC WELL PLANNING
BIT SELECTION SOFTWARE

FIG. 13

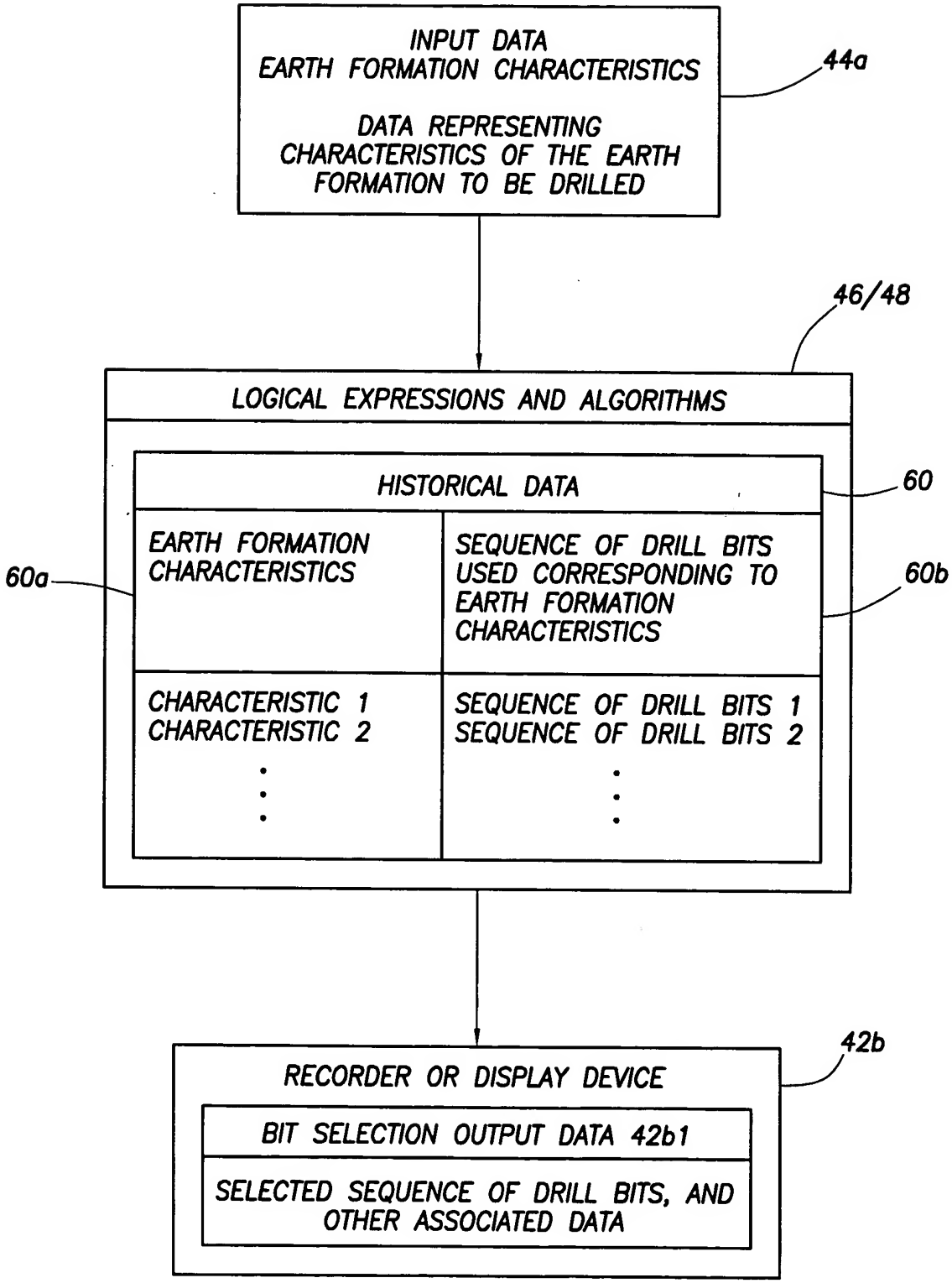

INPUT DATA
EARTH FORMATION CHARACTERISTICS
DATA REPRESENTING CHARACTERISTICS OF THE EARTH FORMATION TO BE DRILLED
44a
46/48
LOGICAL EXPRESSIONS AND ALGORITHMS
HISTORICAL DATA
60
EARTH FORMATION CHARACTERISTICS
SEQUENCE OF DRILL BITS USED CORRESPONDING TO EARTH FORMATION CHARACTERISTICS
60a
60b
CHARACTERISTIC 1
CHARACTERISTIC 2
SEQUENCE OF DRILL BITS 1
SEQUENCE OF DRILL BITS 2
RECORDER OR DISPLAY DEVICE
42b
BIT SELECTION OUTPUT DATA 42b1
SELECTED SEQUENCE OF DRILL BITS, AND OTHER ASSOCIATED DATA

FIG. 14A

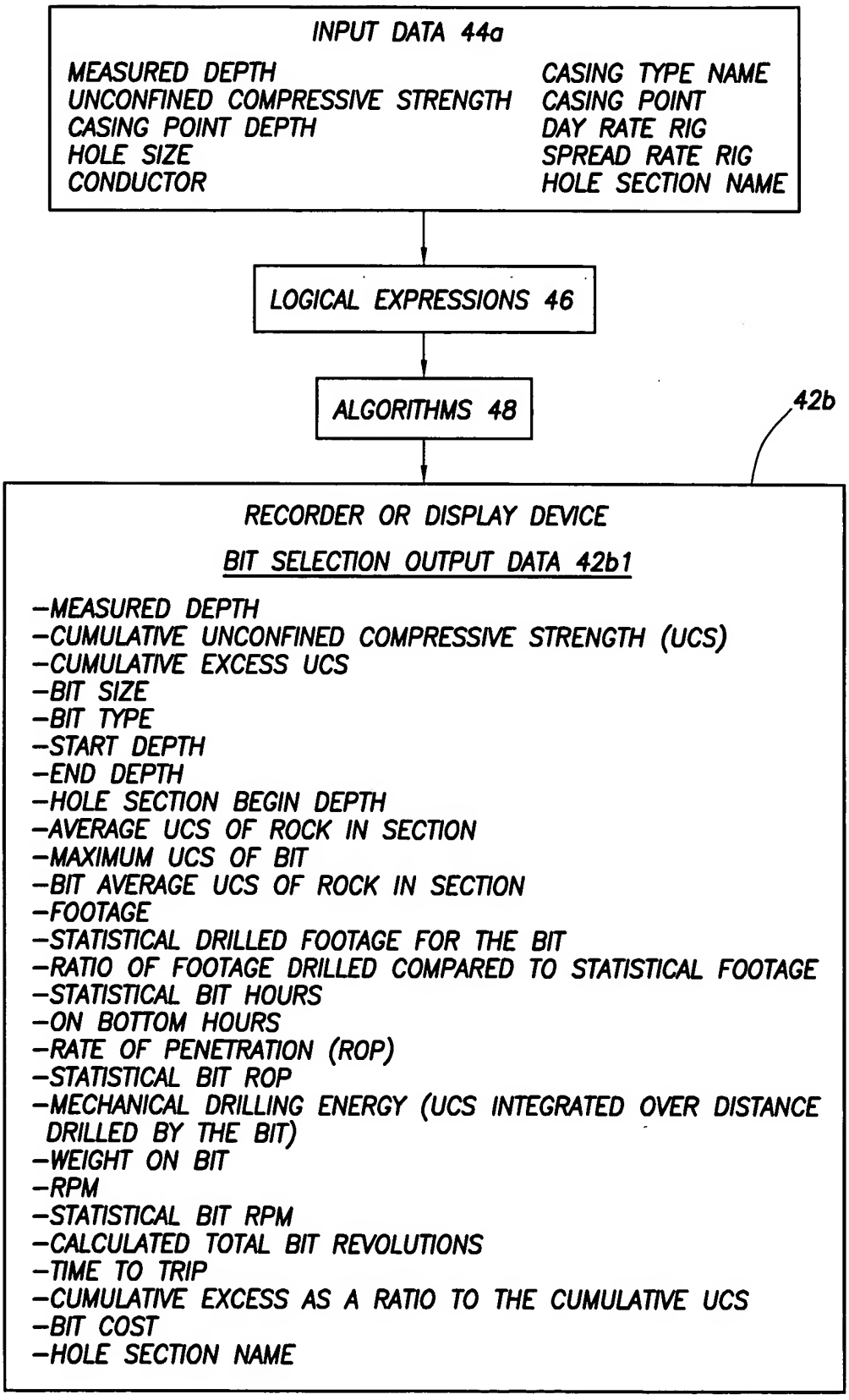

INPUT DATA 44a
MEASURED DEPTH
UNCONFINED COMPRESSIVE STRENGTH
CASING POINT DEPTH
HOLE SIZE
CONDUCTOR
CASING TYPE NAME
CASING POINT
DAY RATE RIG
SPREAD RATE RIG
HOLE SECTION NAME
LOGICAL EXPRESSIONS 46
ALGORITHMS 48
42b
RECORDER OR DISPLAY DEVICE
BIT SELECTION OUTPUT DATA 42b1
-MEASURED DEPTH
-CUMULATIVE UNCONFINED COMPRESSIVE STRENGTH (UCS)
-CUMULATIVE EXCESS UCS
-BIT SIZE
-BIT TYPE
-START DEPTH
-END DEPTH
-HOLE SECTION BEGIN DEPTH
-AVERAGE UCS OF ROCK IN SECTION
-MAXIMUM UCS OF BIT
-BIT AVERAGE UCS OF ROCK IN SECTION
-FOOTAGE
-STATISTICAL DRILLED FOOTAGE FOR THE BIT
-RATIO OF FOOTAGE DRILLED COMPARED TO STATISTICAL FOOTAGE
-STATISTICAL BIT HOURS
-ON BOTTOM HOURS
-RATE OF PENETRATION (ROP)
-STATISTICAL BIT ROP
-MECHANICAL DRILLING ENERGY (UCS INTEGRATED OVER DISTANCE DRILLED BY THE BIT)
-WEIGHT ON BIT
-RPM
-STATISTICAL BIT RPM
-CALCULATED TOTAL BIT REVOLUTIONS
-TIME TO TRIP
-CUMULATIVE EXCESS AS A RATIO TO THE CUMULATIVE UCS
-BIT COST
-HOLE SECTION NAME

FIG. 14B

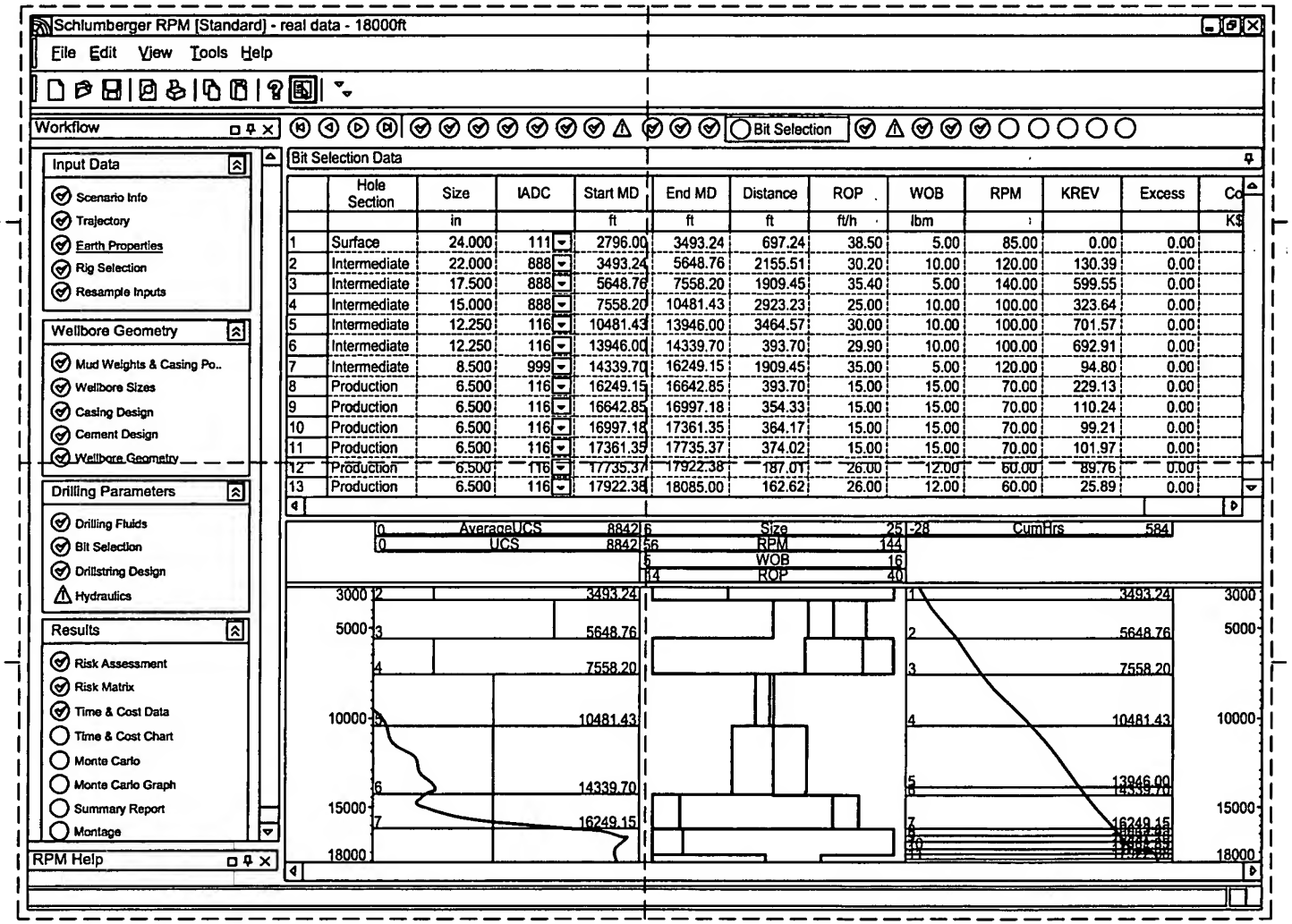


FIG. 15A

FIG. 15B

FIG. 15C

FIG. 15D

FIG. 15

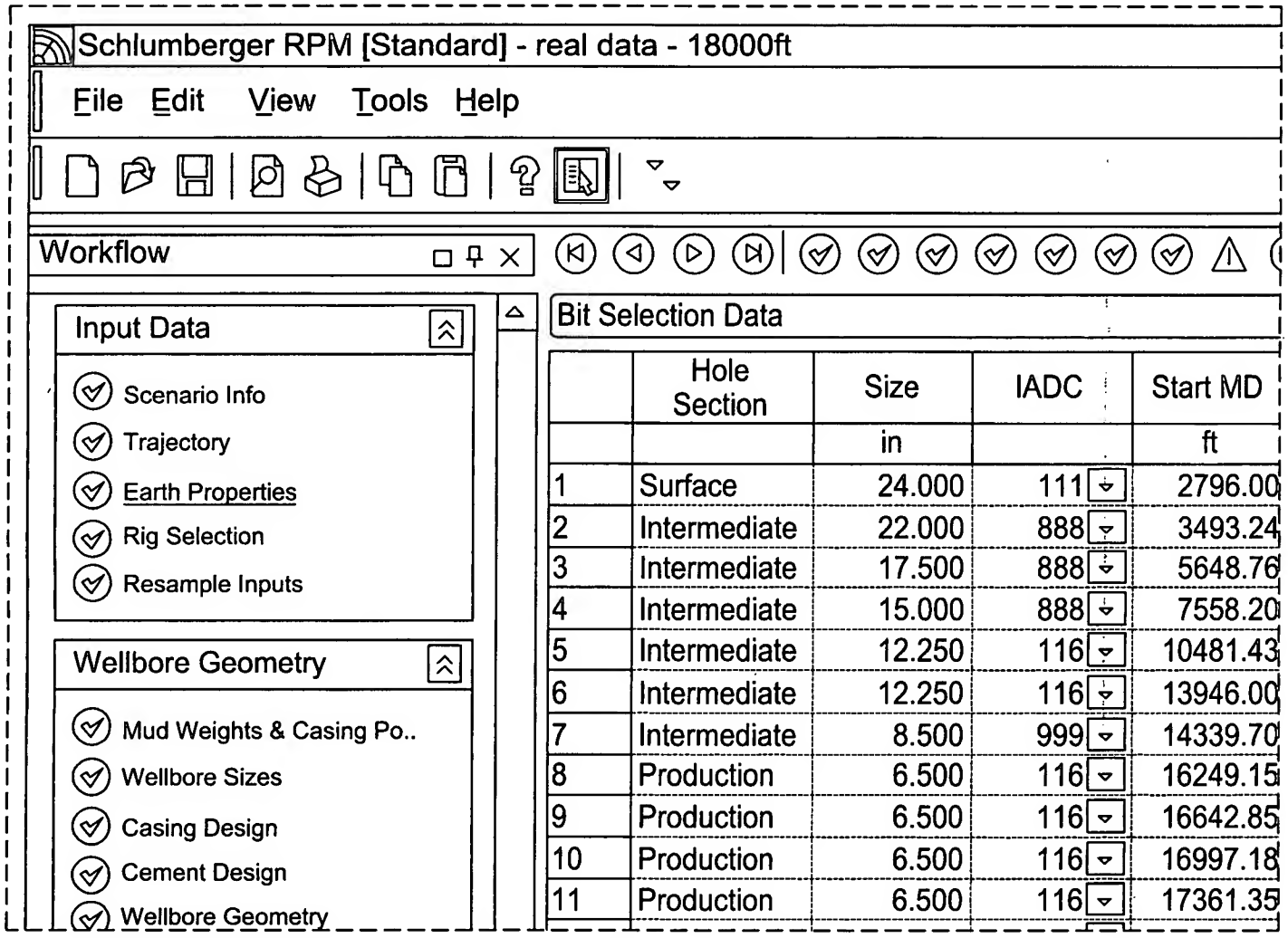
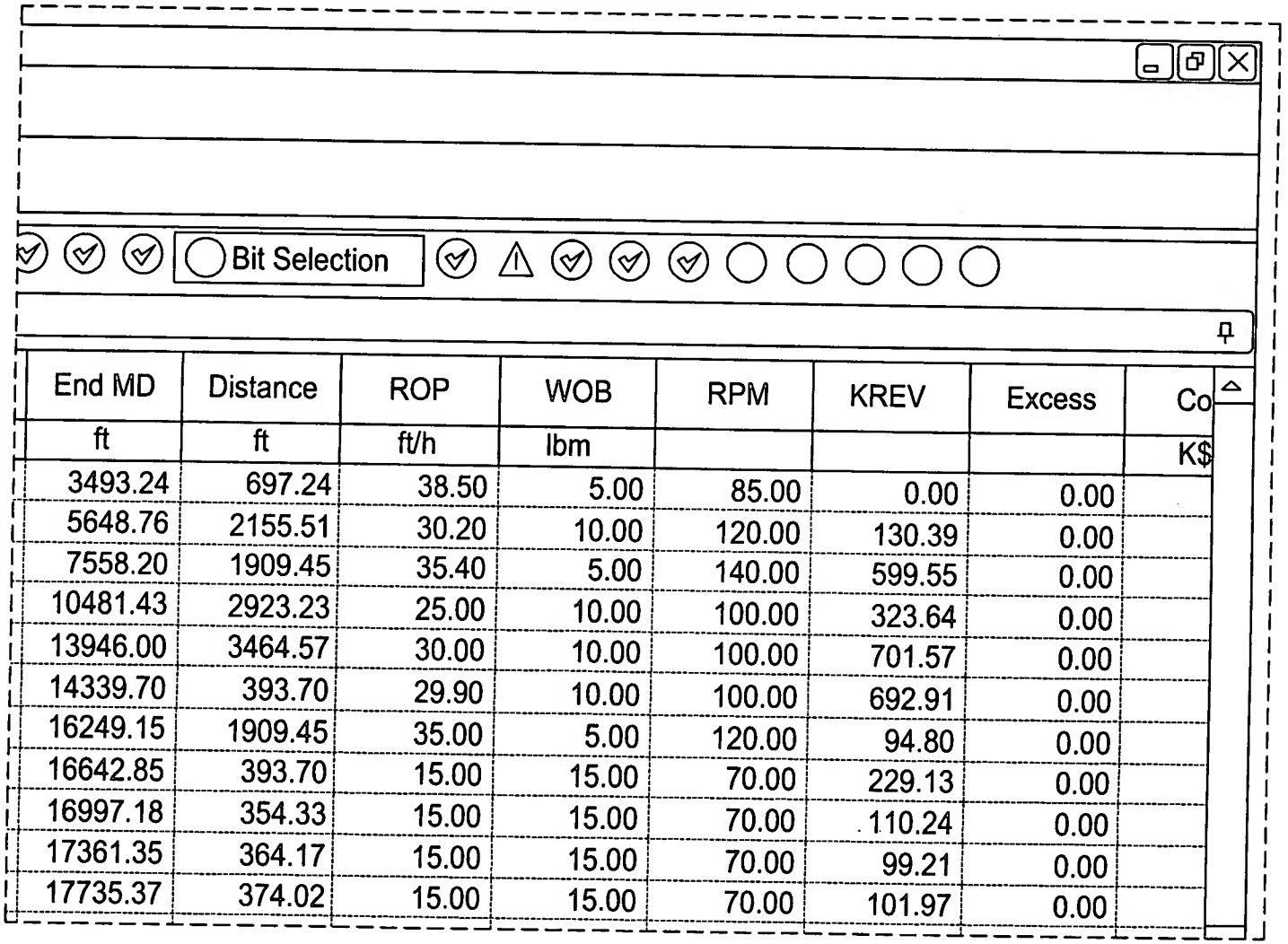

Schlumberger RPM [Standard] - real data - 18000ft
File Edit View Tools Help
Workflow
Input Data
Scenario Info
Trajectory
Earth Properties
Rig Selection
Resample Inputs
Wellbore Geometry
Mud Weights & Casing Po..
Wellbore Sizes
Casing Design
Cement Design
Wellbore Geometry
Bit Selection Data
Hole Section
Size
IADC
Start MD
in
ft
1 Surface 24.000 111 2796.00
2 Intermediate 22.000 888 3493.24
3 Intermediate 17.500 888 5648.76
4 Intermediate 15.000 888 7558.20
5 Intermediate 12.250 116 10481.43
6 Intermediate 12.250 116 13946.00
7 Intermediate 8.500 999 14339.70
8 Production 6.500 116 16249.15
9 Production 6.500 116 16642.85
10 Production 6.500 116 16997.18
11 Production 6.500 116 17361.35

FIG. 15A



End MD	Distance	ROP	WOB	RPM	KREV	Excess	Co
ft	ft	ft/h	lbm				K$
3493.24	697.24	38.50	5.00	85.00	0.00	0.00	
5648.76	2155.51	30.20	10.00	120.00	130.39	0.00	
7558.20	1909.45	35.40	5.00	140.00	599.55	0.00	
10481.43	2923.23	25.00	10.00	100.00	323.64	0.00	
13946.00	3464.57	30.00	10.00	100.00	701.57	0.00	
14339.70	393.70	29.90	10.00	100.00	692.91	0.00	
16249.15	1909.45	35.00	5.00	120.00	94.80	0.00	
16642.85	393.70	15.00	15.00	70.00	229.13	0.00	
16997.18	354.33	15.00	15.00	70.00	110.24	0.00	
17361.35	364.17	15.00	15.00	70.00	99.21	0.00	
17735.37	374.02	15.00	15.00	70.00	101.97	0.00	

FIG. 15B

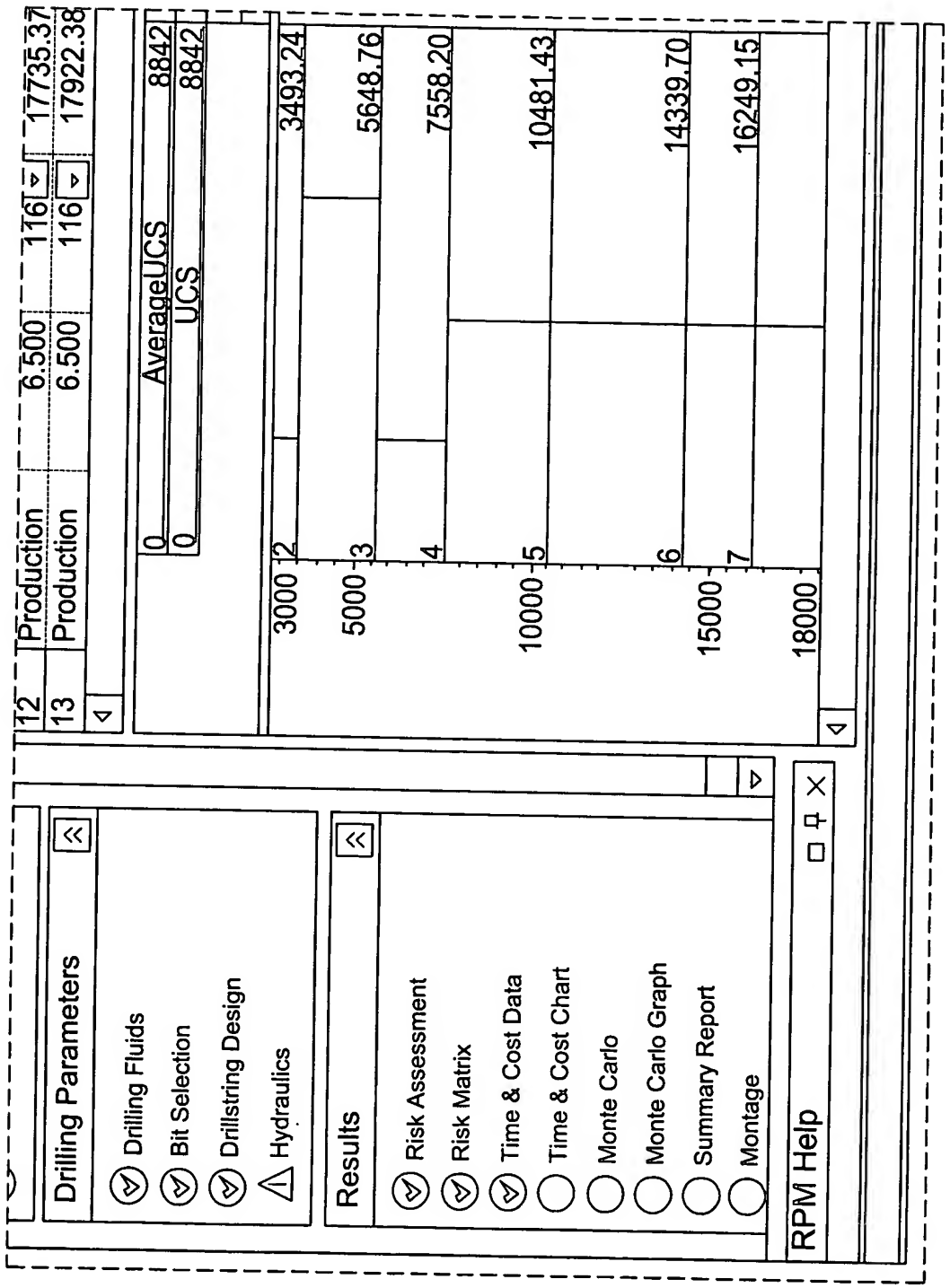

Drilling Parameters
Drilling Fluids
Bit Selection
Drillstring Design
Hydraulics
Results
Risk Assessment
Risk Matrix
Time & Cost Data
Time & Cost Chart
Monte Carlo
Monte Carlo Graph
Summary Report
Montage
RPM Help
12 Production 6.500 116 17735.37
13 Production 6.500 116 17922.38
AverageUCS 8842
UCS 8842
3000
5000
10000
15000
18000
2
3
4
5
6
7
3493.24
5648.76
7558.20
10481.43
14339.70
16249.15

FIG. 15C

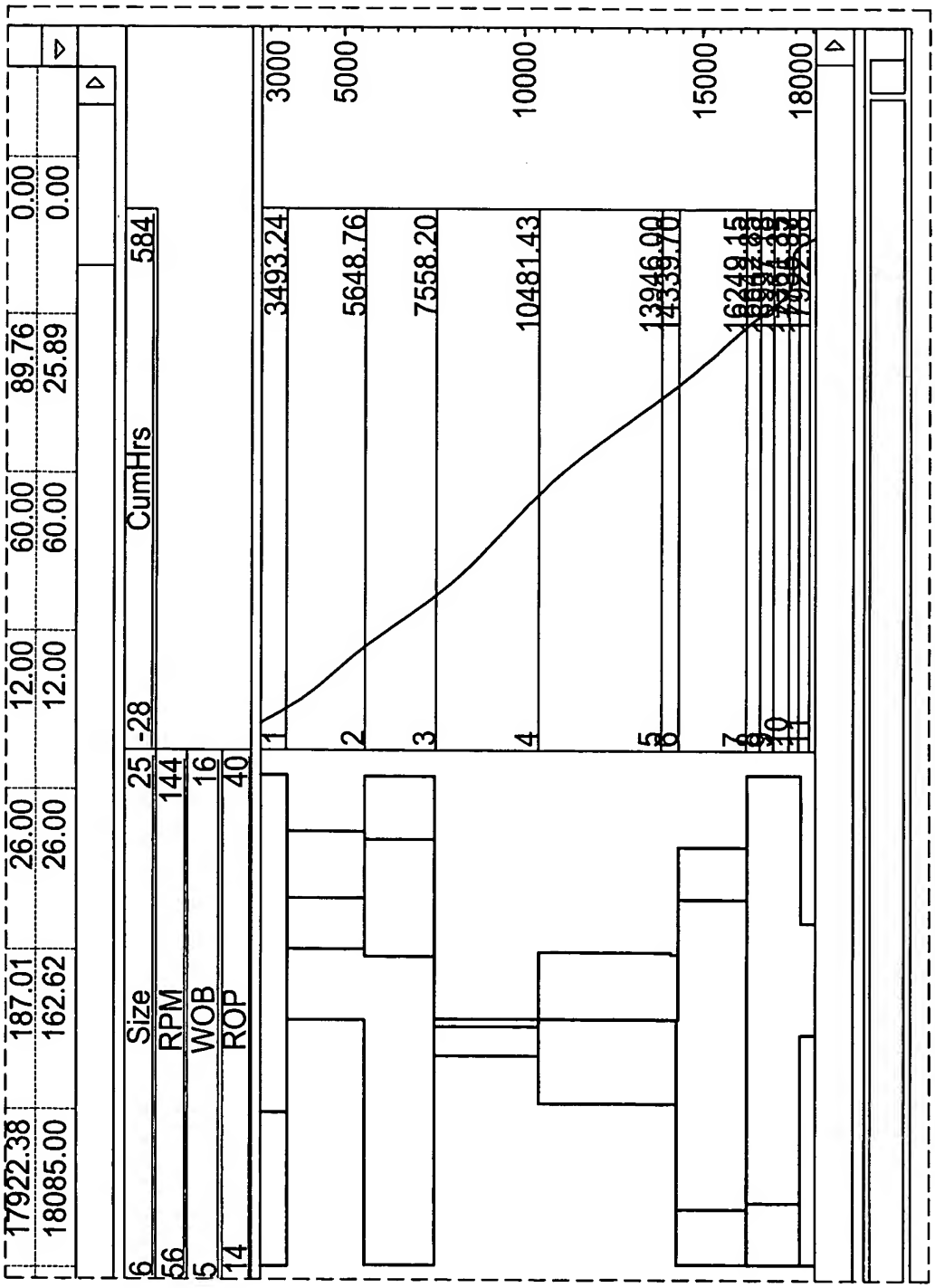

17922.38
18085.00
187.01
162.62
26.00
26.00
12.00
12.00
60.00
60.00
89.76
25.89
0.00
0.00
Size
RPM
WOB
ROP
CumHrs
6
56
5
14
25
144
16
40
-28
584
3000
5000
10000
15000
18000
3493.24
5648.76
7558.20
10481.43
13946.00
14339.70
16249.15
1
2
3
4
5
6
7
8
9
10
11

FIG.15D